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THE BULLETIN

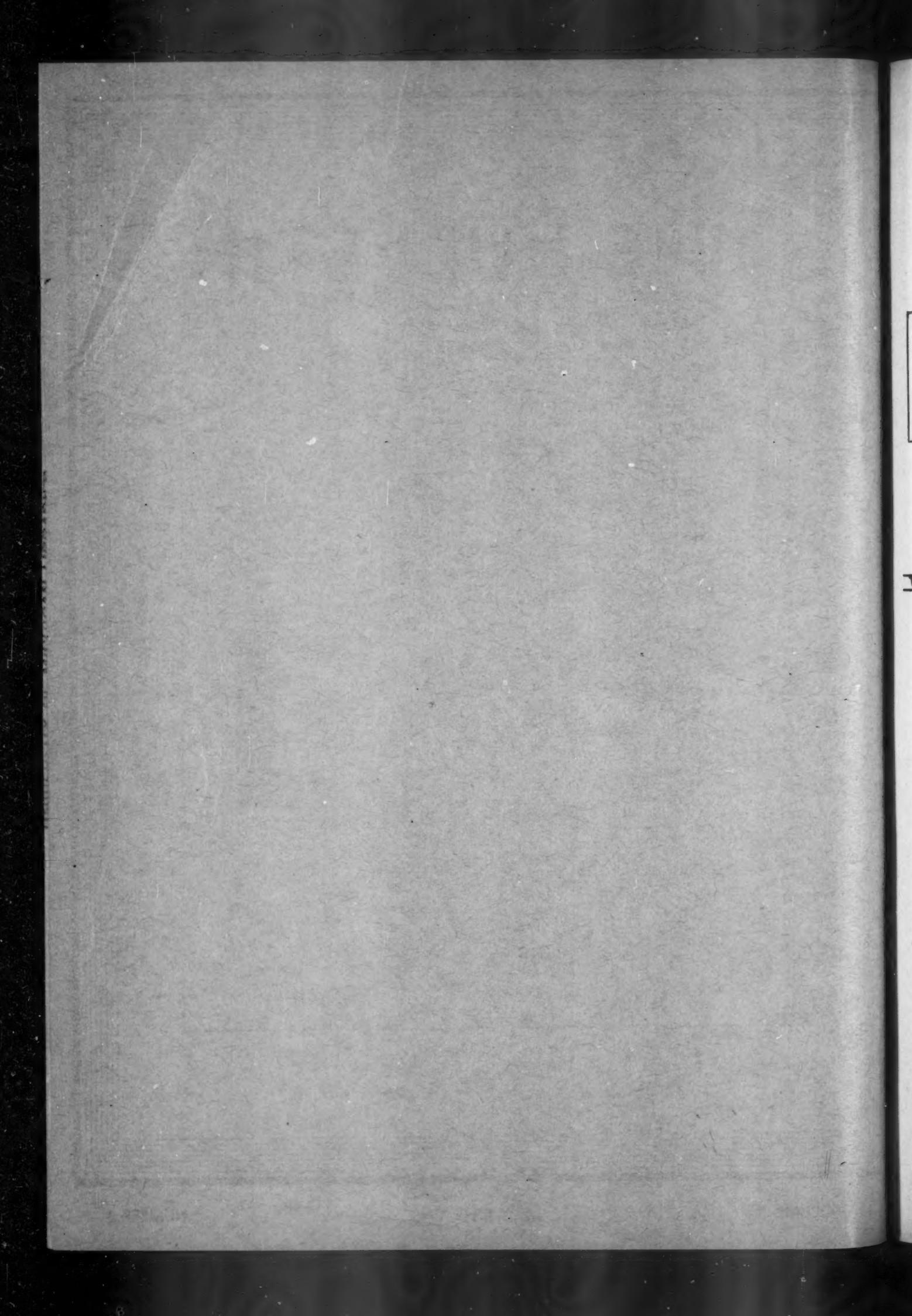
OF THE



VOLUME 2

MAY-JUNE, 1945

NUMBER 3



THE BULLETIN

OF THE



The Bulletin is published bimonthly by the American Society of Hospital Pharmacists, a national organization devoted to the profession of Hospital Pharmacy, dedicated to the interests of the Hospital Pharmacist, and pledged to co-operate with the American Pharmaceutical Association with which it is affiliated.

Contributions of articles by hospital pharmacists, or by others interested in the progress of this important branch of the Public Health profession, will be accepted if they are of general interest to the hospital pharmacist. The Editor reserves the right to revise all material submitted, if necessary.

Manuscripts submitted for publication should be typewritten in double spacing on one side of paper 8½" x 11". Whenever possible a photograph, drawing, or printed form to illustrate the topic that is discussed in the article should be included.

Vol. 2 May - June 1945 No. 3

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Correspondence



Sirs: I was very glad to see THE BULLETIN today and was delighted with its news and scientific topics. I hope that it will find its way out here regularly as it re-stimulates one to get back soon to a rapidly advancing and newly recognized field in Pharmacy.

Lt. O.W. Busch, U.S.C.G.(R)
Philippine Islands

Sirs: I certainly do thank you for putting the notice in THE BULLETIN concerning a position for me in a hospital. I am now working at the Charlotte Memorial Hospital.

Joanne Leist
Charlotte Memorial Hospital
Charlotte, N.C.

Sirs: The March-April issue of THE BULLETIN of the American Society of Hospital Pharmacists was the first issue I received since I began membership in the Society. I have enjoyed it very much and must say that this bulletin is just the thing for us pharmacists working alone in hospitals. It gives us "contact".

Adela Schneider
Southern Pacific Hospital
Houston 1, Texas

Sirs: Congratulations on Volume 2, Number 1 of THE BULLETIN! I truly felt a thrill of pride when I opened my copy the other day. (Mail service to the Islands is rather delayed, as you can see.) The doctors and all others of the professional staff of the hospital have been shown the new and much improved form of THE BULLETIN and they are well impressed. It signifies to me how fast our organization is advancing, what fine leadership we have, and what a bright and shining future we have to look forward to.

The profession of Pharmacy is suffering under rather unique conditions here in Hawaii at present. So far I have been unable to create much interest in our Society of Hospital Pharmacists. However, the pharmacists of the Territory are just now organizing a local society, so perhaps through that, I may be able to make more contacts and appeals for the A.S.H.P. I have received so very much benefit from my membership so far, that I fail to see how anyone can resist joining. THE BULLETIN is always so full of ideas and helps for me that I look forward to each issue with eagerness.

Muriel S. Larson
Leahi Hospital
Honolulu 26, Hawaii

Sirs: I know that you will be interested to learn that we have appointed to the position of pharmacist and purchasing agent Mr. Frank J. Steele, member of your Society, presently a pharmacist on the staff of the John Hopkins Hospital, and whose application was a result of the note in your bulletin.

William J. Donnelly
Administrator
Greenwich Hospital
Greenwich, Connecticut

Sirs: I would like to take this opportunity to thank you for printing my letter in your bulletin which enabled me to secure a position in a hospital pharmacy. Enclosed find \$8.00 for membership in both the American Society of Hospital Pharmacists and the American Pharmaceutical Association.

Alma Robertson
2668 E. 126th St.
Cleveland, Ohio



EDITORIAL

I. Thomas Reamer, Guest Editor
Secretary of American Society
of Hospital Pharmacists

POST-WAR PLANNING

Have you made plans to improve your hospital pharmacy? A study of 5000 responses to a questionnaire entitled "My Plans for Tomorrow" carried out by Drug Topics shows the trend of thought in the retail pharmacy. One-third to one-half of these stores are planning new fronts, bigger stores, installing air-conditioning, replacing interior lighting, floor fixtures, wall fixtures and flooring.

HOSPITAL PHARMACY needs and must have the same type of progressive planning. We should demand our proper share of the budget for the improvement of our departments. Storage facilities are sadly neglected in most institutions. We cannot keep the proper reserve supply of needed items unless more space is provided.

How many of you have air-conditioning? It would indeed be a pleasure to pack capsules, fold powders, mix a few ointments and roll a few pills in a pharmacy with controlled temperature during the months of June-July and August.

Do you like your present flooring? Would it boost morale if your superintendent asked you whether you wanted a new floor and take your choice of linoleum, asphalt tile, composition block, or terraza? While he is still in a good humor ask him for fluorescent lighting. It would probably pay for itself in a few years because you could see that package that always seems to be hidden on the back of the shelf.

Is your ice-box too small? Do you have an ointment mill, colloid mill, ball mill, glass-lined tanks for alcohol, mouth wash and green soap? Do you have plenty of distilled water, or do you need a larger still? Estimate how much you could save for the hospital if you made all the dextrose, saline, vitamins and other sterile solutions needed for the treatment of the patients in your hospital. The economy which you could effect might pay for your needed improvements.

A very large number of hospitals are planning to enlarge their bed capacity just as soon as the materials are available. Hospitals that do not at the present have a pharmacist are anxiously waiting for well-trained hospital pharmacists. In order to take care of this increased demand for trained personnel, the well-organized hospital pharmacies should be making plans to give practical training to our returning pharmacist veterans.

Do not neglect your library facilities. Plan to add at least one book a month to your library for the next twelve months. Revise your system of filing literature so that it is more readily available. Keep a record of the cost of maintenance and income to know just what is happening in your pharmacy. Map out your post-war plans today. Some of these improvements are available now. Hospital income is high at the present time so be sure to get your portion so that your hospital pharmacy will be equipped to provide outstanding pharmaceutical service.

MONTHLY REPORTS EMPHASIZE VALUE OF

PHARMACIST TO HOSPITAL

By John J. Zugich

Among the attributes of an alert hospital pharmacist is an understanding and appreciation of the business problems which confront the management of an institution. Hospitals, not unlike other departmentalized businesses, show activities of the organization by some form of itemized data. With the efforts of our national society and individual members concentrated on uplifting the status of hospital pharmacy, the value of submitting periodic reports should not be overlooked by any hospital pharmacist. Even though not requested by various administrators, a "voluntary" written report can speak volumes in informing the hospital head on the actual operation of the department. In addition to the real information contained therein, it further emphasizes the trend for advancement of present hospital pharmacists, in that

they are a group who recognize the value of proper business methods. The fact remains that the pharmacy is merely one department in the entire institution. Any information that can be recorded on the financial status of a part of this whole will be of value to the administrator in arriving at definite conclusions. By instituting such a report, the pharmacist will find that the administrator will request recapitulations from other departments (if the procedure had been neglected) and ultimately raise the entire standard of the hospital.

THE VALUE OF A MONTHLY REPORT TO THE PHARMACIST

Voluntary written reports are suggested for many hospital executives stress mandatory annual reports but few ask for any monthly summary of activities. When the pharmacist is confronted with the annual task, he finds facts mislaid and pertinent data entered by estimate only. By presenting a report on a monthly basis, the annual report becomes easier by simply correlating previous memoranda submitted. Thus, the hospital pharmacist has available accurate information in his files that conveys a clear picture of his department at any time it is requested, no matter how inopportune.

ILLUSTRATION NO. 1

EDLEWILD SANATORIUM

PHARMACY REPORT FOR THE MONTH OF 194-
Copy for _____.

PREScriptions:

Number Filled	Value Rec'd
_____	\$ _____

REQUISITIONS:

Number Filled	Charges
_____	\$ _____
Total.....	\$ _____
_____	\$ _____

EXPENDITURE FOR MATERIALS RECEIVED.....\$ _____

Difference \$ _____

Memoranda:

Submitted by _____ Pharmacist

Some may argue that a report is impractical either from the standpoint of the time entailed or of the size of the institution served. It is the writer's opinion that some type of report should be presented, as detailed or abbreviated as the needs of the institution or the pharmacist's time warrants. However, it should be written and submitted regularly. It is the aim of this article to offer a discussion on sample forms. These can be modified to fit the particular needs of the hospital the pharmacist is serving. No single form is applicable for each hospital. "All-Inclusive Service" and "Charity" hospitals are not discussed since the writer does not feel qualified to answer adequately the problems of reports as posed by them. Is it not true, however, even in hospitals where no charge is made to the patient for medications that the administrator will be in a far better position to evaluate the service the pharmacist performs and the savings he makes if there is a report submitted summarizing the number of preparations and quantity manufactured and the number of requisitions filled for the various departments? However, the discussion may disclose certain approaches that can be of value for the pharmacist in initiating or revising his reports.

THE SMALL HOSPITAL REPORT

Our first consideration is some form that will fit the needs of the smaller institution. Frequently the chief pharmacist serves in dual capacity as both chief storekeeper and chief pharmacist. Since the storeroom department facilities are separate functions and non-revenue producing, a report should be made separately of these activities. In many instances, the duties of storekeeper are reluctantly

ILLUSTRATION NO. 2			
<u>JONES MEMORIAL HOSPITAL</u>			
PHARMACY REPORT FOR THE MONTH OF <u>194</u> .			
COPY FOR _____.			
<hr/>			
PRESCRIPTIONS:			
Type	Number	Value	
Inpatient	_____	_____	
Outpatient	_____	_____	
Special	_____	_____	
Total.....	_____	Total Prescription Value....	_____
<hr/>			
REQUISITIONS:			
Floor Divisions	NO. REQUISITIONS	NO. ITEMS	CHARGE
1A.....	.....	.....	.....
1B.....	.....	.....	.....
2A.....	.....	.....	.....
3W.....	.....	.....	.....
4E.....	.....	.....	.....
.....
Clinics			
Surgery.....	.....	.....	.....
Medical.....	.....	.....	.....
Pediatrics.....	.....	.....	.....
(and so forth)	.....	.....	.....
Other Departments			
Central Supply.....	.....	.....	.....
Operating Rooms.....	.....	.....	.....
Housekeeping.....	.....	.....	.....
Physiotherapy.....	.....	.....	.....
Anesthesia.....	.....	.....	.....
Outside Requests			
Student Health Service.....	.....	.....	.....
Dental Clinic.....	.....	.....	.....
Public Health.....	.....	.....	.....
(and so forth)	.....	.....	.....
Total.....	.....	.....	.....
<hr/>			
TOTAL PRESCRIPTION AND REQUISITION VALUE....			
<hr/>			
TOTAL MATERIALS RECEIVED VALUE....			
<hr/>			
Difference.....			

Memoranda:

(Example: "Due to inability in securing adequate personnel, the pharmacy may be forced to limit prescription filling hours between periods of 10A.M.-12 Noon and 2 P.M.-5 P.M.")

Submitted by _____
Chief Pharmacist

assumed by the pharmacist. By emphasizing the revenue-producing pharmacy department as exemplified by a good report, he may be able to proffer sufficient data to convince the administrator that the pharmacist's undivided attention to the pharmacy will ultimately yield greater benefits.

The activities of the smaller institutional pharmacy presumably may involve only prescription filling and/or requisition disbursements. The report can be limited to a description of these phases.

See Illustration No. 1.

ILLUSTRATION NO. 3
METROPOLITAN HOSPITAL

PHARMACY REPORT FOR THE MONTH OF 194

Copy for _____

A REPORT FOR A LARGE INSTITUTION

REVENUE PRODUCING				
<u>PRESCRIPTIONS:</u>		<u>Number</u>	<u>Value</u>	
Type				
Inpatient				
Outpatient				
Others				
Total				
.....				
<u>MANUFACTURING:</u>				
Type	Quantity	Cost if Purch.	Actual Cost	Saving
Sterile Sol'n's	L.			
Bulk internal preps:				
Liquids	Gals.			
Bulk external preps:				
Ointments	Kilos.			
Miscellaneous:				
TOTAL SAVING.....				

RECAPITULATION

TOTAL STOREROOM ISSUANCES.....
 (a) TOTAL PRESCRIPTION INCOME
 (b) TOTAL REQUISITION VALUE
 TOTAL (a) & (b)
 TOTAL REVENUE

Memoranda:
(Example: "An 'Inter-com' system in the pharmacy would greatly increase efficiency and save personnel's time.

A program for adopting pharmacy internes
is being outlined for presentation to your office."

Submitted by
Chief Pharmacist

MEDIUM-SIZED INSTITUTIONS

In an institution where the work becomes more complex, a further "breakdown" may give a clearer picture. Here, the requisitions, due to volume, are segregated according to the various departments served. They are clarified as to their number and number of items. This informs the hospital administrator concerning the actual work entailed in the department and does not merely become some abstract figure total. Prescriptions are divided into their various categories, as desired. For the purposes of this article, an example is cited:

See Illustration No. 2.

REVENUE-PRODUCING ACTIVITIES

Revenue-producing activities are self explanatory. In the main, they are itemized by actual moneys received from patients on prescriptions or individual charges. The pharmacist might instruct the business office to make a segregation of cash received and charges made on pharmacy revenue which is to be forwarded to him as a monthly total for incorporation in his report. Thus, he frees himself of the burden of making daily "tallies" of this part of his report.

"SERVICE FACILITY" EVALUATION

The service facility portion of the pharmacy as mentioned, is non-income producing. Its function is similar to other

service departments in the hospital. This service is an issuance or exchange of medicinals needed in the normal operation of a hospital department. Any entrances on the report of these functions are merely "book figures" and no actual income is produced; yet, a varying proportion of the pharmacy personnel's time is involved in granting requisitional requests. This fact is frequently overlooked by the administrator or accounting office if they are inclined to balance expenditures against receipts of the department. By stressing the demands of such activities, the chief pharmacist can make justification for his staff, as partly an operating expense, just as the linen room or the maintenance departments are justified.

To present a plausible argument on this reasoning, the report should show a more accurate evaluation of "service" functions. Requisitions should not be priced on an arbitrary added "10% handling charge" for this gives an inflated picture on the total operating costs of the hospital and is actually another fluctuating estimate. Requisitioned items should be priced at Actual Cost. To compensate, an analysis of the time involved with service activities should be made. This time in terms of "man hours" is pro-rated proportionately as disclosed by figures on requisition number and items on the report. This work should not be the concern of the pharmacist. He merely supplies the figures, explains his plan and the cost accountant in the accounting office makes the actual pro-rated figures from the pharmacist's report. Thus, the actual cost of materials (as noted in proper departmental columns) PLUS the total time in filling (or manufacture) of requisitions will give the real operational cost of the "service" duties of the hospital pharmacy. An illustration is offered embodying some of the principles outlined:

See Illustration No. 3.

As to the actual report form, a temporary master form can be devised by the pharmacist to fit

his institution. This master form undergoes a trial period in a stencilled or type-written format. Later it can be revised to embrace more adequately details that may have been overlooked. If circumstances permit, a standard printed form can then be requested. The administrator will see its benefits and should not be reluctant to grant this request.

THE ANNUAL REPORT

The annual report can be based on the monthly form outline. Accurate figures of past performance are available for ready compilation. These are entered in proper columns in the outline that is now familiar to the administrator. It appears advisable at this time to write a more extensive memorandum to the director emphasizing some outstanding re-evaluations in the yearly summary. If the pharmacist is so inclined, the annual report can be supplemented with a graph or graphs to emphasize some point in a glance.

See illustrations No. 4 and No. 5.

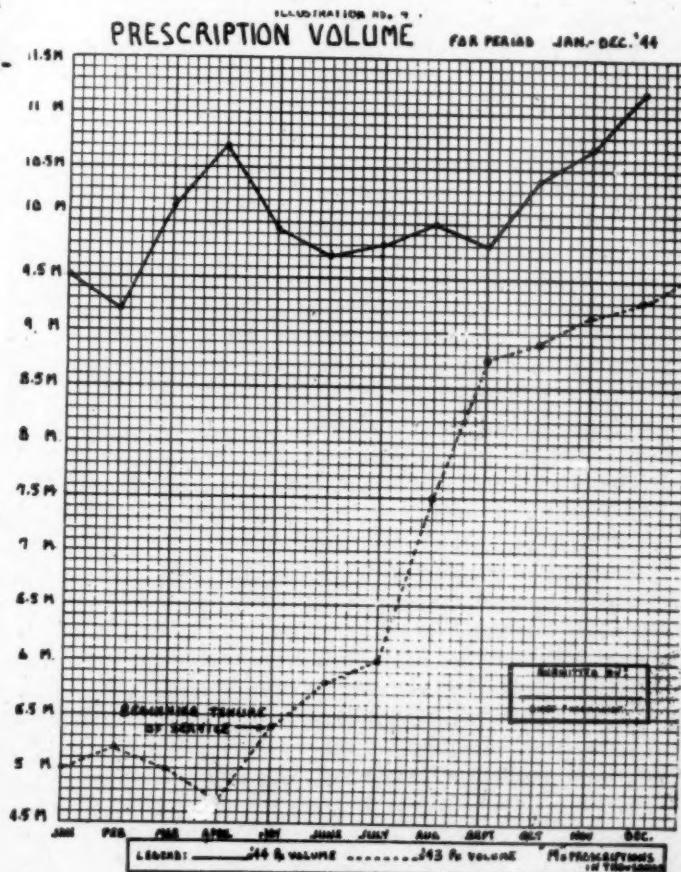
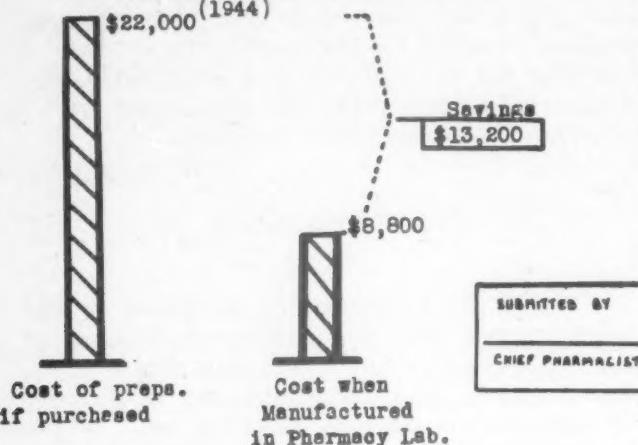


ILLUSTRATION NO. 5

**SAVINGS ACCRUED IN PHARMACY
MANUFACTURING
AT METROPOLITAN HOSPITAL**



SUMMARY

Monthly report forms are presented in sample illustrations which can be adapted for annual pharmacy reports. By presenting them on a voluntary basis, the pharmacist will gain the esteem of the hospital administrator as an individual who is cognizant of proper business methods. His annual task of presenting a résumé of pharmacy activities for the year becomes simpler and much more accurate. Although each hospital pharmacy may demand a variation from those forms illustrated, details can be modified to fit the needs. The more comprehensive report will bear fruit in elevating Hospital Pharmacy as a field that is not only wholly professional but also demanding of business acumen as well.

COTTON VERSUS FILTER PAPER AS A FILTERING AGENT

A.J.Gibson, Chief Pharmacist
University of Michigan Health Service, Ann Arbor

To expedite the filtering of liquids, purified cotton in place of filter paper is suggested as a routine clarifying agent. This applies, whether the quantity of solution is as small as one-half ounce collyrium prescription or a five gallon stock preparation.

My reasons for suggesting the use of cotton are two fold. First, the rapidity with which liquids will filter through a properly placed plug of cotton, as compared to filter paper effects a large saving of time. Secondly, one grade of U.S.P. purified cotton adapts itself to any size funnel as contrasted to the multiple sizes of filter paper of different grades which must be carried in stock for the same purpose. There are other reasons. Solutions will be as fiber free and possess the desired "polish" equal to or better than that obtained using the best grade of filter paper. Another advantage is the comparative ease with which liquids of considerable viscosity will filter through cotton. Tincture of green soap and elixir of terpin hydrate are two prime examples of solutions that defy time and patience in filtering through filter paper, but which are readily filtered through cotton.

Naturally the simplicity in the use of cotton cannot but appeal to the hospital pharmacist, once he has mastered the trick of handling this material. A good rule of thumb is to take a flat piece of cotton one and a half times larger than the stopper that will fit the receiving bottle. Select a flat piece of the desired size as it comes from the roll. Turn the loose fibers in toward the center of the cotton plug. Holding it in this position with the turned edges upper-most, place it in the funnel with a glass stopper or stirring rod on top to hold the cotton in place. Filter a portion (approximately 10% of the liquid) of this solution through the cotton plug. This is to wash down loose fibers and thoroughly "set" the cotton in the funnel. Return this portion of the liquid to the funnel and refilter. If on examination the solution is clear and fiber free, the balance may be filtered at once.

If the procedure outlined is followed reasonably close, no trouble should be experienced. Failure in obtaining satisfactory results can be attributed to, (1) selection of too small a piece of cotton concluded on page 98

HOSPITAL PHARMACY

IN A COLLEGE CURRICULUM



DR. H. GEORGE DEKAY

By H. George DeKay, Ph.D.
Professor of Pharmacy
Purdue University School of Pharmacy

The practice of pharmacy in hospitals is as old as the hospitals themselves but modernization of the professional aspects of pharmacy in hospitals has been lacking for many years. The early hospital pharmacies were usually small dark rooms located in the basement or some other out-of-the-way place and they contained a limited amount of apparatus. This same condition still exists in a few places. Fortunately the majority of the present-day hospital administrators recognize the value of the pharmacy to the hospital and accordingly give it a prominent position.

We only need to examine many of our newer hospitals to realize that some force is being used to educate the hospital of-

ficials to the real value of the pharmacist. This force may be attributed to the growing activity of those who have been employed in the hospitals as chief pharmacists, interns, or assistants. Pharmacists are taking their rightful place as active members of the professional staff of their hospitals. Their value is becoming increasingly recognized by hospital administrators, and hospital pharmacists now take an active part at the meetings of the several hospital associations. These factors bring out one additional point which might be easily overlooked, namely, that hospital pharmacists must be carefully trained to serve and maintain their position of respect and their professional status as members of the hospital staff. They must be qualified to maintain the dignity of their profession and to act as advisor, teacher, and consultant to the hospital personnel.

Recognizing these facts, certain pharmacy colleges have attempted to keep abreast of these changes and have established courses in their curriculum to aid in the development of the profession of



Tablet Manufacturing - Purdue University School of Pharmacy

University School of Pharmacy, being cognizant of the changing status as early as 1938, established a course in hospital pharmacy. This course has developed into a major teaching division in the curriculum of the school of pharmacy at Purdue. We recognize the need for special training in the various areas of hospital pharmacy and have therefore prepared specifically for teaching in many of them. To get first hand information and bring the curriculum up-to-date, we have

spent time in studying the hospital pharmacist at his work. We have visited a number of hospitals and have discussed the problems of the hospital with many of the leading pharmacists in the field in an effort to plan the training of prospective hospital pharmacists so that they will be of superior competence.

I have been asked to discuss our plans for preparing the students of Purdue University, School of Pharmacy, for the position of hospital pharmacist. A paper was presented before the Hospital Pharmacy Section at the Cleveland meeting by Dean Glenn L. Jenkins of Purdue University, School of Pharmacy. In this paper he presents several ideas which we had formulated in the hope of getting suggestions and ideas to incorporate into our course. The results have been most gratifying. The basis of our whole program is the selection of superior high school graduates and their training for specific professional activities in the various phases of pharmacy. The curriculum is quite flexible and a student is able to construct a program that will fit his needs. The entering students are given fundamental courses in biology, chemistry, English, government, mathematics, and pharmacy during their first year in the school with an opportunity to become acclimated to pharmacy before making any choice as to their future curriculum. They have an opportunity to look around and study the opportunities in the various phases of the profession. They are given supervision, counsel and guidance in making their choice.



View of Apothecary - Purdue School of Pharmacy

During the second year the courses begin to shape them for their chosen work. They have an opportunity to select some courses as electives. In the second year they receive training in qualitative analysis, organic chemistry, pharmacognosy, inorganic pharmaceuticals and biology. They are now prepared to make their choice of professional study for the remaining two years of college work. Whatever choice they make, whether it is prescription, retail, commercial or hospital pharmacy, the curriculum is such that they can still interchange in the various fields. The research choice is now limited to definite required work.

The third year in the school gives them specific training in physics, prescription practice, manufacturing pharmacy on a large scale, physiological chemistry, quantitative analysis, biological products and pharmacology. The last year is spent in advanced manufacturing pharmacy and other professional subjects.

The hospital pharmacy choice made by the students means that they have been trained in all the fundamental phases of inorganic, organic, analytical, physiological and biological chemistry. They have a good foundation in biology, bacteriology, biologicals, physiology, pharmacology, and advanced pharmacy, and specific training in dispensing, manufacturing pharmacy, X-ray technic and hospital pharmacy. The student in all branches of pharmacy receives training in English, government, history, psychology, mathematics, physics,

as well as other subjects needed for a well rounded college course.

Realizing the needs of the hospital pharmacists and in an effort to increase their professional status, we, at Purdue, are advocating advanced training in the field of hospital pharmacy leading to the degree of Master of Science. It would materially raise the status of the chief pharmacist in any hospital if he has taken advanced work in this field. The curriculum has been arranged so that the hospital pharmacist who wishes to take advanced training towards this Master's degree will receive special advanced work in pharmacy, biology, chemistry, and pharmacology. The training in pharmacology would deal with practical experimental technics using animals. There will be advanced work in manufacturing pharmacy where they will receive training in the use of power machinery and in bulk manufacture in which the students will manufacture tablets of all types using single punch and rotary machines and all equipment ordinarily used in this work.

The manufacturing pharmacy will be on large scale production as this department supplies medication to the Apothecary which in turn dispenses it on prescription to students. The Student Health Service is in charge of three physicians who are caring for the health of all students in the University. The prescriptions are filled in the Apothecary of the School from the medication made in the manufacturing department. During the average year there are approximately 25,000 prescriptions filled with an additional equivalent of medication dispensed which would bring the total to 50,000 or more prescriptions a year. This shows the volume of practical experience gained by the student.

The course content in hospital pharmacy, as such deals with the following:

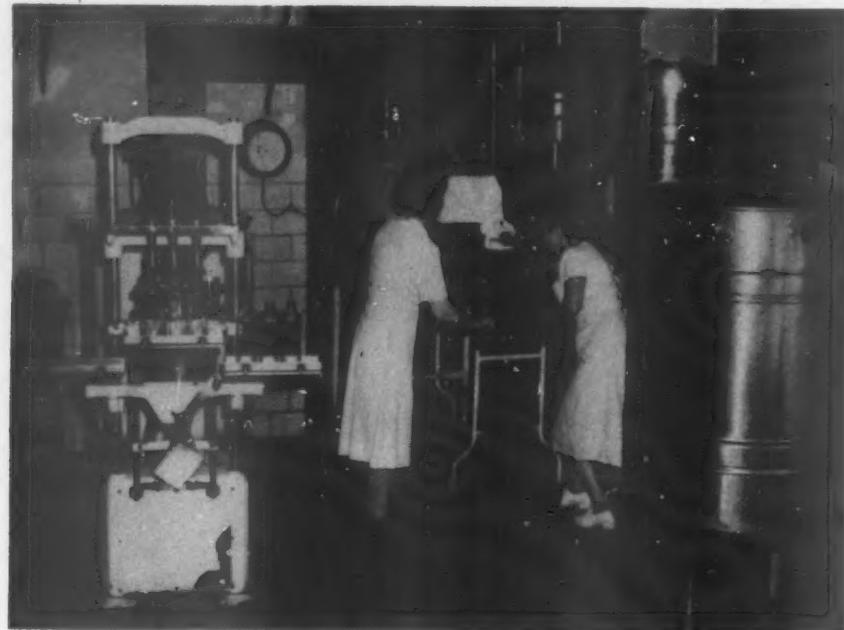
1. History of hospitals and hospital pharmacy.
2. Types of hospitals.
3. Staff of hospitals.
4. The pharmacist in the hospital organization.

5. Standards of hospitals and hospital pharmacy.
6. Theory and practice of pH measurement.
7. Buffer solutions.
8. Sterilization, theoretical and practical.
9. Isotonic solutions.
10. Ampuls, filling, sterilizing, testing.
11. Hospital Formularies.
12. Narcotic control.
13. Records and forms in a hospital pharmacy.
14. Pharmaceutical manufacture and control.
15. Practical work in library research and teaching.
16. Allergenic preparations.

The laboratory work deals with the following:

1. Testing of water for hardness.
2. Testing of distilled water.
3. pH measurements by means of indicators and potentiometer.
4. Sterilization of surgical dressings and equipment.
5. Testing the efficiency of the sterilizer by means of chemical and bacteriological control.
6. Sterilization of solutions and testing sterility.
7. Isotonic and buffer solutions.
8. Ampuls, filling, sterilizing, and testing sterility.
9. Pharmaceutical manufacture.
10. Allergenic preparations.

As the profession of hospital pharmacy advances, it will be necessary for the schools to increase the courses and course content to aid in this development. Newer (concluded on page 100)



Intravenous Solution Department At Charity Hospital

THE DEPARTMENT OF PHARMACY CHARITY HOSPITAL OF LOUISIANA

By A. P. Lauve, Chief Pharmacist

The history of Charity Hospital can be traced back more than two hundred years. It was founded by a sailor named Jean Louis, who died in New Orleans in the year 1736. In his will, Jean Louis left sufficient money to provide for and equip two small buildings for the sick poor of the city. There were no doctors to visit the sick in this hospital and there were no medicines, but it offered a refuge for those who had become ill and who had nowhere to go. From this humble beginning grew the largest and most modern hospital in the Southland.

In 1836, the first hospital to occupy the present site of Charity Hospital was built. It was in use for more than 100 years and witnessed many remarkable developments in the field of medicine. At the time it was put into use, there were no operating rooms; operations were performed in the wards without anesthesia. Its wa-

ter supply consisted of the amount that could be contained in a few cisterns. The great discoveries of Pasteur and Lister were fifty years away. The variety of diseases which appeared in its wards, however, attracted the attention of physicians throughout the country, and by 1859 New Orleans had become one of the great medical centers in America. The old buildings which had been in use for so many years were becoming more and more dilapidated, so in 1933 plans for new buildings were drawn up. The "project" included the construction of a new main building, a nurses' home, an ambulance house, a laundry, and a power plant. In 1939 the various sections of the hospital moved into the new quarters.

In planning the new hospital, the economic importance of the pharmacy was well recognized. The site selected on the sixth floor has more than 9000 square feet of floor space. This was subdivided into ten



Tablet Manufacturing At Charity Hospital

rooms in order to handle efficiently the reception of ward orders and prescriptions, manufacture, compounding, sterilization, refrigeration, storage, and offices for the head of the staff. New and adequate equipment was provided to permit manufacturing in quantities large enough to meet most hospital needs.

The economic value of a well-planned pharmacy for a hospital of some 3000 beds can be appreciated only by the service it renders. In selecting equipment for the pharmacy, we kept in mind not only the requirement of the hospital, but also the type of preparations we could manufacture most economically and efficiently and at the same time afford greatest savings to the hospital. After it was decided what we proposed to manufacture, we then selected the equipment best suited for our purpose.

We knew from past experiences that parenteral fluids could be made successfully in the pharmacy. The equipment selected for this important phase of manufacture were two thirty-gallon capacity steam-operated water stills with bafflers, a bottle-filling machine, a glass-lined mixing tank with electric agitator and a steam-operated autoclave with automatic recording thermometer. Water purity test-

ing apparatus and other necessary safeguards were also purchased. This equipment has been in operation for over five years, producing approximately ten thousand liters of various intravenous fluids each month with complete satisfaction. Clean equipment, properly operated water stills, freshly distilled water, proper sterilization, and constant care in manufacturing have made possible our success in the intravenous solution field. Our solutions enjoy the confidence of the staff, and we have no reaction problems with which to contend.

A tablet manufacturing plant was also installed, consisting of a granulating mixer, granulator, electrically heated dryer, and single-punch tablet machine. This equipment provides the hospital with its requirement of tablets such as Ascorbic Acid, Thiamin Hydrochloride, Riboflavin, Niacin, Phenobarbital, Sodium Phenobarbital, and Aspirin. Some 300,000 tablets are manufactured monthly.

Other equipment purchased for the pharmacy were an ointment mill, glass-lined mixing tank with electric agitator, pressure filter, drying oven, homogenizer, and an Eppenbach colloid mill. This equipment has made it possible for the pharmacy to manufacture most of the essential re-
Continued on page 76

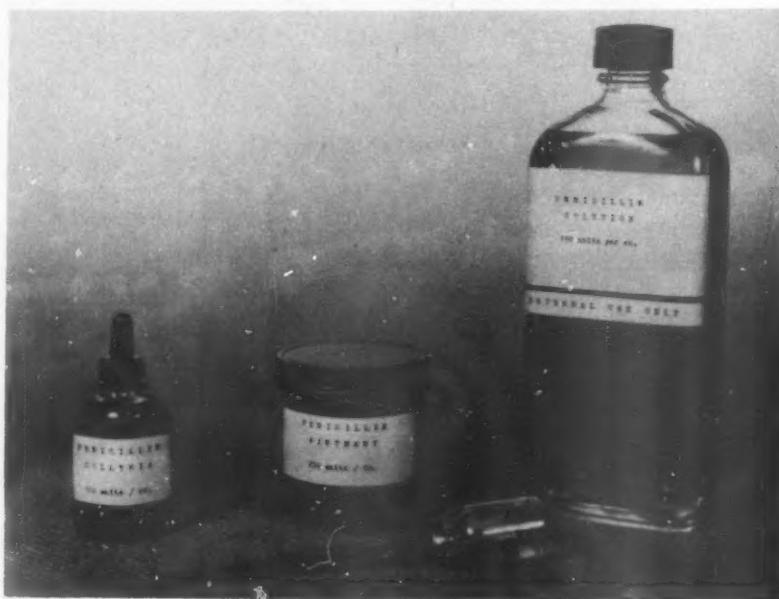
COMPOUNDING AND DISPENSING TECHNIQUES FOR PENICILLIN PRODUCTS

By Francis X. Sturmer, Ph.G.
Chief Pharmacist
Buffalo General Hospital

The restrictions and system of distribution of penicillin during the past year has enabled the hospital pharmacy to do work on penicillin products in a pioneering manner. This opportunity has opened a field for the development of new and distinct types of medications, and the experience and observations of the hospital pharmacist should be of immeasurable value to the retail pharmacist now that penicillin is available for his use.

Aside from parenteral use, the greatest demand for penicillin products arose in the division of eye, ear and skin medications. We, therefore, bent much energy in the direction of these three divisions. Since there were not available any pre-determined strengths or methods of preparation and dispensing, it was necessary to develop definite techniques of compounding and dispensing the products, and establishing close contact with the medical staff to study and observe the clinical results, both from the physicians' and the pharmacists' point of view.

With the adequate facilities at our disposal in the hospital, it was no difficult task to maintain strict sterility in handling the materials to produce a completely sterile product. This precaution was taken to safeguard the completed product from contamination with any foreign substance which might have a deteriorating effect on penicillin. We, therefore, set up the necessary equipment to be used



Penicillin Preparations

prior to each manufacturing period. These items included: glass mortars and pestles, several spatulas, ointment jars, collapsible tubes, dropper bottles, flasks, graduates, tuberculin syringe and needle, 5-cc syringe and needle, and alcohol for sterilization; also, sterile gauze, papers, towels, vials, and flasks of sterile injectable water and normal saline, and Hydro-sorb. After sterilization everything was refrigerated. At no time was the penicillin subjected to anything but refrigerator temperatures. True, the retail pharmacy would find it difficult to maintain such accurate sterility in their preparation of these products, but they can and should take precaution that those items of equipment which cannot be sterilized in their place of operation can, at least, be scrupulously clean. Under no condition, however, should the vial containing the penicillin solution be contaminated.

Preparing solutions of penicillin presents no problem, but close observation in clinical use revealed many interesting and important details which would, under ordinary conditions, be overlooked. These details included such things as adequate and suitable strengths, pH, and kind of solvent needed. These factors vary according to the use and manner in which the solutions are to be applied.

WET DRESSINGS

Solutions for wet dressings were found to be most effective when used in a strength of 250 units per cc., dissolved in distilled water. At first normal saline was used as a solvent in all of the preparations we prepared, but there occurred a puzzling dermatitis which we naturally blamed on the penicillin or its impurities, but later discovered after a process of elimination that it was caused by the evaporation of water from the normal saline resulting in the formation of a hypertonic solution. Whether or not this is encouraged by the penicillin we do not know, but the substitution of water for the saline solution ended the annoyance. We also observed that if the pH of the finished product was too high, it caused an irritation in certain cases. This necessitated a careful study of the pH of solutions used and the results were extremely gratifying. Penicillin in solution has a tendency to lower the alkalinity, and when dissolved in hypotonic saline solution, the pH was 6.25; in normal and hypertonic saline solutions the pH was 6.4. Thus it is seen that the saline solutions were not only irritating to the skin, but also presented a higher pH than would be desired for local applications. Penicillin dissolved in distilled water has a pH of 5.5 which was ideal for this particular purpose. This observation has governed us in all our ensuing work. The wet dressings, so prepared, were then dispensed in sterile flasks for use.

EAR DROPS

Ear drops for instillation and pack-

ing were prepared with distilled water, and were dispensed in sterile dropper bottles. The strength of these solutions varied from 500 units per cc. to 20,000 units per cc., entirely at the discretion of and according to the therapeutic aim of the physician. Since the greater strength was not used extensively a broad observation of its value cannot be given. The lesser strength was very satisfactory and most used.

EYE DROPS

Eye drops were prepared with normal saline solution. This is obviously the best vehicle for this purpose, and a strength of 500 units per cc. was effectively used. The drops while effective, worked better when combined in treatment with penicillin ointment.

OINTMENTS

In developing penicillin ointment, it evolved that a single preparation was most suitable for both ocular and dermatological uses. This is an ointment of 250 units per gram in a base composed of equal parts of Hydrosorb(Abbott) and distilled water. In addition to extreme care in preparing and dispensing this ointment, observations were again necessary in the matters of pH, and the solvent and vehicle used. As previously mentioned, the pH of penicillin in distilled water being 5.5 and the pH of Hydrosorb being 6.0, this item of consideration was settled quite easily. When mixed, this combination produced a pH of 5.7 which was quite suitable. Then came the feature of compatibility. Hydrosorb makes a stable, homogeneous mixture which holds up well at refr'gerator temperatures, and thus this vehicle was suitable from this other important consideration.

In preparing the ointment, most effective results were obtained by dissolving the penicillin in the required amount of sterile, cold distilled water and incorporating it gradually into the Hydrosorb. Thorough incorporation and smoothing of

the product cannot be stressed too much since a loosely prepared ointment is not as effective in the initial applications, and becomes mitigated to half its effectiveness in a short time. The ointment was dispensed in sterile jars, and sterile ophthalmic tubes. The following observations were made in regard to mixtures, pH, effectiveness and stability. In this study a uniform amount of specimen was used to obtain comparative results. These results are, of course, relative to the amount of sample used.

A mixture of equal parts of Hydrosorb and distilled water with 250 units of penicillin per gram was found most stable and effective. This mixture gave an inhibition on an agar plate, 3 cm. in diameter. This ointment was kept at refrigerator temperature for 30 days, and the effectiveness was the same at the end of that time. Another ointment identical in character but loosely compounded, deteriorated in two weeks' time. This leads to the conclusion that thorough incorporation and smoothing promotes the life and effectiveness of the product. At room temperature the ointment was ineffective at the end of eight days.

A mixture of 75% distilled water and 25% Hydrosorb was not as finished a product upon refrigeration, and its stability was less than the mixture of equal parts of Hydrosorb and water.

By incorporating a minimum amount of solution of penicillin into the Hydrosorb, a preparation producing very little inhibition resulted.

CONCLUSION

Penicillin in solution, even though refrigerated, deteriorates rapidly, and no more should be dispensed than can be used in a few days' time.

Penicillin thoroughly incorporated in Hydrosorb is, in a certain measure, protected from deterioration, and when kept refrigerated, retains its strength for considerable time. Even so, only amounts sufficient for a few days' interval should be dispensed to provide a margin of safety.

Eye drops may be dispensed in a strength of 500 units per cc. in normal saline solution.

Ear drops may be dispensed in strengths of 500 to 20,000 units per cc. in distilled water.

Ointments, both ophthalmic and dermatological, may be dispensed in a strength of 250 units per gram in a thoroughly smoothed homogeneous base of equal parts of Hydrosorb and distilled water. Refrigeration of materials, equipment and finished products is of utmost importance. Caution and sterility in compounding is of great importance and value.

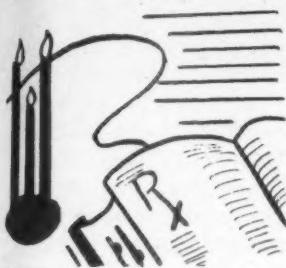
CHARITY HOSPITAL Concluded from page 73

quirements of the hospital at great savings. It has rendered a service which under ordinary conditions would have not been possible.

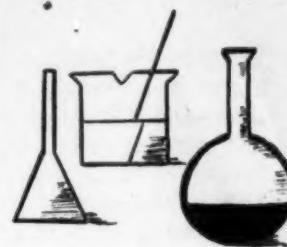
The pharmacy enjoys the confidence and respect of the visiting and resident staffs and its facilities are always available to lend whatever assistance it can to members of the staff and to the Tulane University and Louisiana State University Medical Schools.

The manufacturing facilities of the pharmacy are used by the students of Loyola University College of Pharmacy. The students gain not only valuable hospital experience, but also learn the value of machinery in modern pharmaceutical manufacturing. The junior and senior students spend several hours each week in the pharmacy manufacturing and compounding under the supervision of members of the college faculty and registered pharmacists on the hospital staff.

A shortage of trained personnel has been our greatest handicap. The service we can render is of course limited by the number of trained pharmacists in the department. A shortage of trained hospital pharmacists is evident in all hospitals in New Orleans, and no improvement can be expected under the present scale of wages and working conditions until hospital administrators learn the value of good pharmacy service and some effort is made to encourage the better type of pharmacists to make hospital pharmacy a career instead of just another job.



NOTES AND SUGGESTIONS



A SECONAL ELIXIR

A palatable Seconal elixir having but a slight bitter after-taste may be prepared by the following formula. Each 4 cc. of the finished product contains approximately 15 mgm. of Seconal, Lilly (1-methyl butyl, allyl 1 barbiturate). This preparation should be of interest, especially to your pediatrician. The slight after-taste is easily disguised by administering the elixir in milk.

	<u>Gms. or cc.</u>
Seconal Sodium	0.4
Alcohol	12.0
Glycerin	45.0
Diluted Hydrochloric acid	0.6
Syrup Acacia	20.0
Syrup Glycyrrhiza	
q.s.	100.0

PENTOBARBITAL SODIUM INJECTION

A stable solution of pentobarbital sodium for injection may be prepared using propylene glycol as a vehicle. The finished solution contains 150 mgm. of pentobarbital sodium. This solution is intended primarily for intramuscular injection.

Gm. or cc.

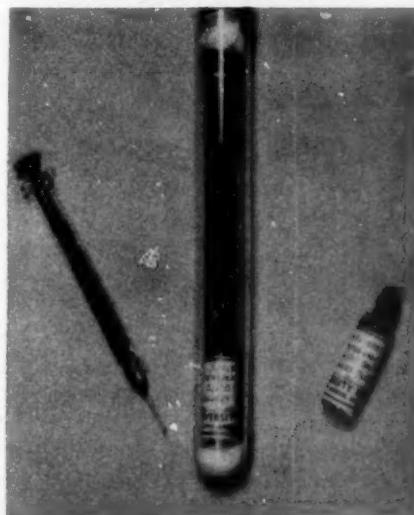
Pentobarbital Sodium	15.0
Benzyl Alcohol	2.0
Propylene Glycol	60.0
Distilled Water, sterile	
pyrogen free q.s.	100.0

Prepare the solution aseptically using sterile technic and equipment throughout. Filter the finished solution through a bacterial filter and fill aseptically into dry-heat sterilized containers. Benzyl alcohol is included for its local anesthetic and bacteriostatic properties.

If preferred a 60% solution of propylene glycol in water may be first autoclaved and then used as the vehicle for preparing the finished product. In either case the preparation should be sterilized by bacterial filtration and prepared aseptically.

Injection Pentobarbital Sodium will be found particularly valuable for the emergency treatment of eclampsia, tetanus and other convulsive states, and for combatting convulsions caused by C.N.S. stimulants such as cocaine, strychnine, picrotoxin and most local anesthetics.

EMERGENCY KIT



When time is a vital element in the emergency treatment of the symptoms of overdosage with central nervous system stimulants, or for the treatment of convulsive states, many valuable minutes can be saved by having a rubber diaphragmed sterile vial of pentobarbital sodium solution, together with a sterile syringe and needle ready for instant use. The kit consists of an 8" x 1" test tube which contains a 5cc rubber stoppered vial of Injection Pento-

barbital sodium 150 mg./cc. A sterile needle with syringe attached is inserted through the diaphragm top of the vial. The open end of the test tube is closed by a stopper. The resulting assembly is then ready for instant use and the contents of the test tube will remain sterile indefinitely. The accompanying photograph illustrates the individual components, as well as the finished emergency kit.

PENICILLIN DILUTION APPARATUS



Penicillin vials may be rapidly diluted to the desired concentration by using the apparatus shown in the accompanying photograph. The diluent, either a sterile solution of physiological saline or distilled water is suspended at some convenient point. A 10 cc. Luer-Lok syringe with an attached two-way valve is connected by means of rubber tubing to the adapter of the sterile solution. The two-way valve permits the syringe to be filled with the diluent--as the plunger is pulled out to the 10-cc mark the diluent enters the syringe through the valve. The needle may then be inserted through the rubber top of the bottle of penicillin and 10 cc of diluent--or the desired quantity--filled into the bottle. When 10 cc of diluent is added it is not necessary to use an air filter, however when diluting penicillin vials containing 200,000 units, a simple air filter may be constructed by placing a small piece of cotton in a hypodermic needle as

shown in the right portion of the illustration. An air filter is needed when adding 20 cc of diluent because the pressure created within the vial is so great that it makes filling difficult and leaves an undesirable air pressure within the vial.

An all metal 10-cc syringe with a spring attachment which automatically fills the syringe to the 10-cc mark is also shown in the right portion of the illustration.

The illustrated 10-cc glass syringe is designated Number 10LLC-Luer-Lok control. The two-way valve may be ordered as Number 470V.

The needle is an 18 gauge, 1½ inch, while the all metal 10-cc syringe is designated as Number 470SO. A special small diameter rubber tubing may be ordered as Number 606T; usually six feet is required. All of these items may be obtained from Becton, Dickinson and Company, Rutherford, New Jersey.

INSTRUMENT STERILIZING SOLUTION

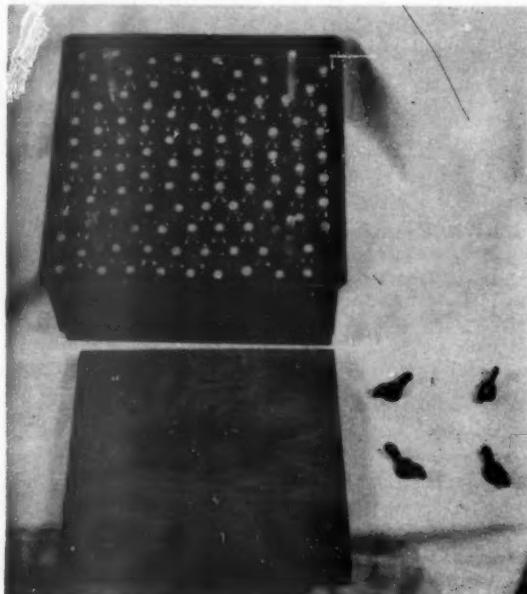
Zephiran chloride 1:1000 is an effective bactericidal solution for the chemical sterilization of surgical instruments. This solution may be used also for the sterilization of rubber goods and optical instruments. For sterilization the materials should be immersed in the solution for 30 minutes. If desired, they may be transferred to a Zephiran chloride solution 1:5000 for storage. An anti-rust agent should be added to solutions which are to be used for the storage of metal instruments to prevent corrosion. An effective anti-rust agent is sodium nitrite, which is used in a 0.1% concentration.

PENICILLIN NEWS

The W.P.B. has announced that effective August first penicillin will be released for use in tablets, lozenges, ointments and other preparations. Calcium penicillin has already been released for parenteral use. A suspension of penicillin in oil and beeswax is now marketed by E.R.Squibb and Sons. 200,000 unit vials of penicillin, in the form of the calcium salt as well as the sodium salt, are now available from most of the major companies.

A VIAL HOLDER

A handy device to secure rubber stoppers in vials during the autoclaving process may be readily constructed from metal and plywood. Such a container is shown in the accompanying photograph. It consists of a plywood base with 4 upright bolts over which a copper container having 4 holes in its base is placed in such a manner that the bottom of the metal box is in contact with the top of the plywood base, as shown in the illustration. A plywood cover, also with 4 holes as shown, is slid down over the bolts so that it comes in contact with the rubber stoppers of the vials to be autoclaved. Metal washers and wing bolts are then fitted to the protruding bolts and screwed down tight so that they hold the vials securely.



A piece of cloth should be placed on top of the rubber stoppers to prevent their sticking to the underside of the plywood cover when it is removed after the autoclaving process. The cloth should be wet with water before attempting to remove it from the top of the rubber stoppers, otherwise the stoppers may stick to the dry cloth and be pulled out.

The illustrated copper box measures

27 cm. x 27 xm. x 10 cm.; two rows of 7 perforations on each side of the container facilitate the passage of steam during the autoclaving process. The plywood base is 23.5 cm. x 23.5 cm. x 1.2 cm. The plywood should be heat and water resistant. The plywood cover has the same dimensions as the base. Any size bottle or vial up to 12 cm. in height can be autoclaved in this.

The bolts are 1 cm. x 16 cm. with 16 cm. distance between the bolts. The copper container lasts indefinitely while the plywood becomes warped after about 500 autoclavings and then has to be replaced. This apparatus may be readily constructed by the engineering department of your hospital. If duraluminum or stainless steel is available, the base and cover may be made from one of these.

SYRUP OF VITAMIN B COMPLEX

	Gm/cc
Thiamin chloride	1.25
Riboflavin	0.25
Pyridoxine hydrochloride	0.075
Calcium Pantothenate	0.20
Nicotinic acid	5.00
Distilled water	200.00
Syrup Cherry qs. ad.	500.00

Dissolve the niacin and riboflavin in water with the aid of heat. Cool, add the other ingredients and filter. Average daily protective dose for infants is 0.25 cc, approximately 5 drops.

DUPONAL is a trade name covering a class of materials which are salts of the half acid esters of long chain fatty alcohols. These alcohols may run from 8 to 20 carbon atoms in length and may be saturated or unsaturated. The usual Duponals met with by the pharmacist are: Duponal WA paste and flakes, and Duponal ME paste and flakes. These are all the same except for purity. The active ingredient is the sodium salt of the half sulfuric acid ester of "Lorol". Lorol is a saturated alcohol containing alcohols C-8, C-10, C-12, C-14, C-16 and C-18, of which C-12 is about 50%. The various Duponals contain approximately the following percent of sodium alkyl sulfate: WA paste, 30%; WA flakes, 50%; ME paste, 55%; ME flakes 92%. Sodium sulfate is the principal impurity.



1945 ANNUAL MEETING AMERICAN SOCIETY HOSPITAL PHARMACISTS CANCELLED

The annual convention of the American Pharmaceutical Association and its affiliated organization, the American Society of Hospital Pharmacists has been cancelled for the current year in compliance with the request of the Office of Defense Transportation. The Council of the American Pharmaceutical Association in making the announcement requested all officers and committee members, whose terms of office would normally expire in 1945, to continue in their respective offices and capacities until the next regularly called convention.

All officers and committee chairmen of the Society who ordinarily submit reports to the annual convention are urged to present their annual report in triplicate to Secretary I. Thomas Reamer at Duke University Hospital not later than July 31, 1945. One copy of the report is kept on permanent file by the Secretary, one copy is sent to the Editor of the Bulletin while the third copy is sent to the National Association. These reports afford a record of the year's accomplishments and serve to keep the membership informed of current progress.

All members of the Society who were scheduled to present papers at the 1945 annual convention are expected to send copies of their manuscript in triplicate to Program Chairman Evelyn Gray Scott at St. Luke's Hospital, Cleveland 4, not later than August 1. The submitted papers will be reviewed for publication in the Journal of the American Pharmaceutical Association and the Society's Bulletin.

For the first time since 1861 the annual convention of the American Pharmaceutical Association had to be postponed--then as now, War conditions are responsible for the postponement.

The third meeting of the MASSACHUSETTS SOCIETY OF HOSPITAL PHARMACISTS was held on May 16, 1945, at the Memorial Hospital in Worcester. Guest speakers were Prof. Lesslie Ohmart of the Massachusetts College of Pharmacy and Mr. Timothy Shea of the Board of Registration in Pharmacy. Prof. Ohmart's talk was entitled "The Improvement of Local Therapy". Mr. Shea's theme was "The Hospital Pharmacy Association and What It Can Do for the Profession of Pharmacy".

Officers for the year of 1945 were elected as follows: Mr. Carl A. MacDonald of the McLean Hospital, chairman; Mr. Mur-

phy of the Mass. General Hospital, vice-chairman; Miss Rose Tricomi of the Newton-Wellesley Hospital, secretary; and Sister Marie Edwards of St. Vincent's Hospital, treasurer.

The program and supper which was served by the Memorial Hospital was arranged by Mr. Joseph Barry. Inspection of the Pharmacy Departments of the Memorial Hospital, St. Vincent's Hospital, and The Worcester City Hospital followed the business meeting.

The next meeting is to be held Wednesday, September 19, 1945 at 8 PM, at the Cambridge Hospital. All hospital pharma-

cists are invited to attend.



Rose Tricomi, Secretary and Carl A. MacDonald, Chairman, Massachusetts Society of Hospital Pharmacists.

The April meeting of THE MARYLAND ASSOCIATION OF HOSPITAL PHARMACISTS was held at the Church Home Hospital. The following new officers were elected: Anthony P. Mentis, president; Milton W. Skolaut, vice-president; and Frank J. Steele, secretary-treasurer.

THE HOSPITAL PHARMACISTS ASSOCIATION OF PHILADELPHIA have elected the following officers for the coming year: president, William Levin, Philadelphia General Hospital; vice-president, Miss Estelle Kisonas, West Jersey Hospital; secretary, Mrs. R. Strimel, Women's Homeopathic Hospital; and treasurer, Miss Thelma Connelly, Frankfort Hospital.

The association held a picnic and garden party, June 16, sponsored by the Smith Kline and French Company at Linden Lawn Farm, Oreland, Pennsylvania.

The second meeting of the TOLEDO SOCIETY OF HOSPITAL PHARMACISTS was held in June, at the Toledo Hospital. In addition to the hospital pharmacists the Toledo Society is comprised of several pharmacists with prescription stores who are affiliated as associate members.

THE HOSPITAL PHARMACISTS OF CHICAGO-LAND held its final summer meeting, June 19th. This is a cooperative meeting held for prescription pharmacists as well as

hospital pharmacists.

For the next year the group has adopted threefold objective: (1) co-operation with all branches of Pharmacy, (2) monthly discussions of the newer pharmaceutical preparations, and (3) work to increase the membership.

THE CLEVELAND SOCIETY OF HOSPITAL PHARMACISTS held a meeting at the Huron Road Hospital on April 25th. Mr. Hayba presented an interesting talk on the origin and development of thermometers. Following the talk there was a general discussion on the purchasing of pharmaceuticals with special emphasis on USP and NF items. The suggestion was made that there should be a laboratory of testing pharmaceuticals used by hospitals. At the next meeting a dinner will be held. Following the dinner the new officers will be installed.

THE ASSOCIATION OF HOSPITAL PHARMACISTS OF THE MID-WEST has established a fund for a gift membership in the American Pharmaceutical Association and the American Society of Hospital Pharmacists. This gift membership fund is to be available for pharmacy graduates interested in hospital pharmacy.

At the May meeting of the group the following officers were elected: president, Wilma K. Maus, Mercy Hospital; vice-president, Sister M. Carmelia, St. Joseph Hospital; secretary, Phyllis Platz, Bryan Memorial Hospital; and treasurer, Mr. Haschburger, Lincoln General Hospital.

The annual meeting of the LOUISIANA SOCIETY OF HOSPITAL PHARMACISTS was held June 5th, in the Rose Room of the Jung Hotel. The Society was entertained with an informal banquet given by the Winthrop Chemical Company.

The newly installed officers are: chairman, Mr. Herbert J. Mang, Oschner Clinic; vice-chairman, Mr. Guy Lief, Marine Hospital; secretary, Miss Valerie C. Armbruster, Charity Hospital; and treasurer, Miss Alberta Le Blanc, Baptist Hospital.

President H. C. Painter of the AMERICAN ASSOCIATION OF GOVERNMENT PHARMACISTS recently made the following committee appointments according to a report by A. H.



CURRENT LITERATURE OF HOSPITAL PHARMACY

HOSPITAL MANAGEMENT (April, 1945)

"How Hospital Pharmacists Can Help Round Out Intern's Training" by Hans S. Hansen, Chief Pharmacist, Grant Hospital, Chicago. Suggestions for aiding the medical intern through the pharmacy department. A list of subjects is given as a guide for the hospital pharmacist who would like to carry out such a program.

page 90

"A New Danger To Public Health" - An editorial urging higher standards in hospital pharmacies.

page 100

"A Hospital Pharmacist's Diary" by Paul Cole, Chief Pharmacist, Michael Reese Hospital, Chicago, Illinois - Surveys the hospital scene.

page 96

HOSPITAL MANAGEMENT (May, 1945)

"How Pharmaceutical Industry Made Penicillin Abundant" - A brief story of Penicillin as presented in the book "Yellow Magic", hospital book of the month, by J. D. Ratcliff.

page 166

"A Hospital Pharmacist's Diary" by Paul Cole, - Surveys the hospital scene.

page 110

HOSPITALS (June, 1945)

"Requisition Slip That Speeds Drug Issue" by Leroy C. Brown, Superintendent, Stamford (Conn.) Hospital - A description of the method used to charge drugs at Stamford Hospital with illustration of the requisitions used in order to keep accounting procedures accurate and up-to-date.

page 60

MODERN HOSPITAL (May, 1945)

"Drugs Used in Diagnosis" by Fred W. Ellis, Department of Pharmacology, School of Medicine, University of North Carolina, - A list of the chief drugs accepted for diagnostic purposes.

page 92

MODERN HOSPITAL (June, 1945)

"Drugs Used in Diagnosis-II" by Fred W. Ellis - A continuation of article in May Modern Hospital.

page 92

SOUTHERN HOSPITALS (April, 1945)

"The Intrinsic Value of Pharmacy Internships" by John Zugich, Pharmacist, Oak Ridge Hospital, Oak Ridge, Tennessee - Advantages of internships to the pharmacist and to the hospital.

page 78

"With the Hospital Pharmacist" by D. O. McClusky, Jr. - News items concerning hospital pharmacists.

page 76

SOUTHERN HOSPITALS (May, 1945)

"An Approach for Metric System Adoption in Institutions" by John Zugich - A method for changing from the apothecary system to the metric by introducing the system to the nursing staff and providing doctors with a metric equivalent card. Illustrations of sample card of equivalents, requisition list and a prescription blank for institutions are shown.

page 83

"Poppy - Friend or Foe" - Reprints of recent articles concerning the narcotic problem throughout the world.

page 80

SOUTHERN HOSPITALS (June, 1945)

"University of Michigan Has Model Hospital Pharmacy" - A brief description of the University Hospital Pharmacy at Ann Arbor, Michigan, including the work of the members of the pharmacy staff.

page 80

"With the Hospital Pharmacist" by D. O. McClusky, Jr. - News items concerning hospital pharmacists.

page 78

"Did you know that... " by John J. Zugich - A monthly column consisting of items of interest from technical and professional literature.

(concluded on page 86)



NEWS ITEMS

VETERANS PHARMACISTS PROMOTED

Effective July first all pharmacists in Veterans hospitals will be advanced to Professional and Scientific Grade 2 with a salary range from \$2600 to \$3200. In addition the pharmacists will be classified as professional, rather than sub-professional as in the past. At present the Veterans Administration employs 154 pharmacists but the expected expansion of Veterans hospitals will require 50 more pharmacists by the end of 1946. Application for these positions may be made to the Director of Personnel, U.S. Veterans Administration, Washington, D.C. The Veterans Administration prefers pharmacists with hospital experience; however, other pharmacists will be considered.

The Veterans Administration is interested in maintaining a high quality of pharmacy service in its hospitals, according to Dr. Ewald Witt, Chief of the Veterans Administration, Subdivision of Pharmacy. As quoted by DRUG TOPICS Mr. Witt recently said,

"We of the Veterans Administration are not interested in having pharmacists in the service unless they are registered men and willing to keep their registrations up-to-date. We practice pharmacy in our hospital pharmacies and we need professional men. Many of our elixirs and other preparations are made in our pharmacies rather than purchased in prepared form. We insist upon high professional standards of practice and are not interested in hiring men who have not kept up with the profession."

In addition to this splendid advancement the Veterans Administration has made in utilizing the professional services of its pharmacists, additional proposed legislation affecting pharmacists in Veterans Administration has been introduced

by Representatives John E. Rankin, Democrat of Mississippi and Edith Nourse Rogers, Republican of Massachusetts. These identical bills provide for the appointment of 164 pharmacists to serve in a proposed administrative corps of the Department of Medicine and Surgery of the Veterans Administration. The plan provides for a semi-military corp with one pharmacist as officer of the chief grade, a rank equivalent to lieutenant colonel; eight in the senior grade, equivalent in rank to majors; forty in the full grade corresponding to captains; seventy-five in the associate grade, ranking as first lieutenants and forty in the assistant grade, corresponding in rank to second lieutenants.

ALFRED D. SCHIFF is being transferred from the Veterans hospital in Whipple, Arizona, to the Veterans Facility at Des Moines, Iowa.

MR. HAROLD W. FIELDS is now chief pharmacist at the French Hospital, New Orleans.

MR. JOSEPH O. GEANELLONI is employed at Hotel Dieu Hospital, New Orleans.

MISS MARGARET NORRIS of Charity Hospital and MISS ANNA ST. PIERRE of Army Dispensary, Port of Embarkation, have left on a trip to visit a number of hospital pharmacy departments in San Antonio and Galveston.

THE BULLETIN is sent free to all Colleges of Pharmacy in the United States. In addition it is sent to Canada, Mexico, New Zealand, Australia, Hawaii, the Philippines, the Canal Zone, and Puerto Rico.

MR. ALFRED TRAHAN is leaving Charity Hospital, New Orleans, to accept a position with Blanchard and Robertson, Apothecaries.



Anna D. Thiel

ANNA D. THIEL, Chief Pharmacist of Jackson Memorial Hospital, Miami, Florida, is an active worker for the progress of Pharmacy. In addition to being secretary of the Southeastern Hospital Pharmacists Association, Miss Thiel is a member of the Southeastern Florida Pharmaceutical Association and of the Florida Academy of Pharmacy.

The Association is vitally interested in co-ordinating the interests and activities of Florida pharmacists and also sponsors public programs designed to bring additional knowledge of the public health services of the pharmacist to his community.

On one of these programs held at W G B S, Miss Thiel presented a discussion on "The Hospital Pharmacists Place in Pharmacy Advancement". In addition, Miss Thiel has discussed hospital pharmacy and the community work of the hospital before several business men's service clubs of Miami.

The Florida Academy of Pharmacy meetings are held at the Jackson Memorial Hospital. The leading pharmacists of Southeastern Florida are represented at these meetings. Legislation affecting

pharmacy is discussed and interesting prescriptions received in drugstores and in hospital pharmacies are reviewed.

Miss Thiel also writes a monthly column and editorial for the Cadet Nurses Paper, PATHOGEN.

MRS. ETHEL WAGNER SAMS is returning as Chief Pharmacist of Touro Infirmary, New Orleans.

MISS ESTELLE GLAVIANO of the New Orleans Hospital and Dispensary for Women and Children will be on leave for a one-month trip into Mexico about the middle of June.

MR. ANDREW LOPEZ of New Orleans, formerly with Sickle's Fund has resigned his position to go into the retail drug business.

GLENN L. JENKINS, Dean of the School of Pharmacy at Purdue University has been appointed by Indiana's Governor Gates to a three-year term on the Indiana State Board of Health. Dr. Jenkins is the first pharmacist to be appointed to this position. Under the provisions of a bill recently passed by the Indiana legislature it is now mandatory that one pharmacist be included on the new nine-member board of health.

I. THOMAS REAMER, Secretary of the A.S.H.P., Member of the North Carolina Board of Pharmacy, Chief Pharmacist at Duke University Hospital, Manager of Reaco Pharmaceutical Company, recently acted as chairman of a successful local druggist's Bond Rally at Durham.

Sample copies of this issue of THE BULLETIN are being sent to the pharmacists in all Texas hospitals of 100 or more beds and to all pharmacists of United States Public Health Service Hospitals. Copies of the preceding issue were sent to all Veterans Administration Hospitals.

JOHN F. MILLER, formerly with the Corozal Infirmary, Panama Canal Zone, is now employed as a pharmacist at Oak Ridge Hospital, Oak Ridge, Tennessee.

ALMA ROBERTSON of Nezperce, Idaho has

been appointed to a pharmacy internship at St. Luke's Hospital in Cleveland.

JOANNE LEIST who was graduated from Purdue University School of Pharmacy has accepted a position in the pharmacy at Charlotte Memorial Hospital, Charlotte, North Carolina.

LAWRENCE TEMPLETON has resigned his position at the University of Illinois College of Pharmacy. Dr. Templeton has entered into partnership in the management of a Chicago drugstore.

ALABAMA ALLIED HEALTH COUNCIL

Alabama is waging vigorous co-ordinated campaign to solve its public health problem and to insure better health for its people, regardless of economic status.

To accomplish this program an Allied Health Council has been formed. Included in this Council are representatives of all public health professions, including medicine, pharmacy, dentistry, nursing and hospitals.

The State of Alabama is one of the first to attempt the organization of a statewide co-ordinating council for health purposes. Legislation has been introduced which will provide seven regional hospitals, sixty district hospitals, and fifty health centers to serve the health needs of the people of Alabama.

Among the pharmacists represented on the Council are: D. O. McClusky, President of the Southeastern Hospital Pharmacy Association and Editor of the Pharmacy Department of Southern Hospitals, Dr. Leon Richards, Dean of Pharmacy at Howard College; P. V. Tubb, President and R. I. Lanier, Vice-President, Birmingham Retail Druggists Association; Jamie Meigs, President, Hoyt Carlisle, Vice-President of the Alabama Pharmaceutical Association; E. E. Gibbs, Secretary, and Lehman Alley, Treasurer of the Alabama State Board of Pharmacy and Thelma Coburn, Executive Secretary of the Alabama Pharmaceutical Association.

The State of Alabama is to be congratulated on its progressiveness. Especially commendable is its plan for the co-or-

dination of the activities of all public health programs. This program should give the hospital pharmacists an excellent opportunity to improve inter-professional relationships. U.S. Surgeon General Parran has sent a letter congratulating the Alabama Allied Health Council on its progressive plan to co-ordinate health activities in Alabama.

DR. IVOR GRIFFITH, President and Research Director of the Philadelphia College of Pharmacy and Sciences spoke on a program sponsored by Lederle Laboratories, Incorporated, over a nationwide blue network hookup, June 29. Dr. Griffith discussed - PHARMACY... THE DOCTOR'S RIGHT HAND MAN. Members of the American Society of Hospital Pharmacists were sent a reprint of Dr. Griffith's talk.

FRANK JOHN STEELE formerly of the pharmacy staff at Johns Hopkins Hospital has been appointed chief pharmacist at the Greenwich Hospital, Greenwich, Connecticut.

VIRGINIA DRISCOLL and NELLY NIGRO, recent graduates of Creighton University College of Pharmacy have been appointed hospital pharmacy interns at St. Luke's Hospital, Cleveland.

ALICE APPEL of Creighton University College of Pharmacy is now employed in the pharmacy at Mercy Hospital, Toledo, Ohio.

The TOTAL MEMBERSHIP of the American Society of Hospital Pharmacists is now more than 500. The goal of 600 members by September 15th can be reached if each member of the Society will give but ten minutes of his time in contacting other hospital pharmacists who are not yet members of the organization. Each new member is sent back numbers of THE BULLETIN for the year 1945. Will you contact your non-member hospital pharmacist this week?

The report of the National Commission on children in Wartime recommends a tenfold increase of money to provide increased maternal and child health programs, including an expanded crippled children's program. Retiring Secretary of Labor, Frances Perkins in transmitting the plan to President Truman advised that increased health services must be provided for the Nation's children.

POSITIONS IN HOSPITAL PHARMACY

LEAHI HOSPITAL, 649 Pokole Street, Honolulu 26, Hawaii, is desirous of obtaining a well-qualified young woman pharmacist who has a good education and a minimum of one year pharmacy internship or equivalent experience. Leahi Hospital is a tuberculosis hospital of 487 beds located within the city limits of Honolulu. The salary for the position is \$215 per month plus full maintenance. Those interested are requested to make application to H.H. Walker, M.D. Director, by airmail.

GEORGETOWN UNIVERSITY HOSPITAL, Washington, D.C., is a 230 bed institution which is anxious to employ a hospital pharmacist. Make application to Sister M. Pauline, Superintendent.

BETHESDA HOSPITAL, Oak and Reading Road, Cincinnati 6, Ohio, is looking for a registered pharmacist. Superintendent A.N. McGinnis writes that there is "opportunity for a young woman to work into executive position. Alternate Sundays off and half day off each week. Night calls on rotation. We consider maintenance worth \$45 per month."

U.S. MARINE HOSPITAL, Mobile 16, Alabama, would like to employ a pharmacist. Letters of application giving age, experience and other pertinent information should be forwarded to R.M. Hovey, Assistant Pharmacist (R) U.S.P.H.S. at the U.S. Marine Hospital in Mobile.

HOLZER HOSPITAL at Gallipolis, Ohio, is looking for a well-qualified hospital pharmacist for its department. The starting salary will be about \$250 per month, depending on the previous experience and the qualifications of the individual. Make application to Leo Mossman, Chief Pharmacist.

THE MEDICAL COLLEGE OF VIRGINIA offers internships in hospital pharmacy for both men and women. One position is open July 1. Salary is \$50 per month plus complete maintenance and uniforms. Appointments are for one year with a certificate of internship granted. Experience is provided in manufacturing, stock control, prescription practice and minor research. Application may be made to Dr. Wortley F. Rudd, Dean of the School of Pharmacy.

CURRENT LITERATURE, concluded from page 82

JOURNAL AMERICAN PHARMACEUTICAL ASSOCIATION (June, 1945)

"The Hospital Pharmacist" by Leo Godley - An editorial resulting from the 1944 resume of hospital service in the United States. Statistics show that pharmacy service has increased in recent years and hospital pharmacists are urged to provide professional pharmaceutical service for patients. page 159

AMERICAN PROFESSIONAL PHARMACIST (April, 1945)

"What Are Functions of Hospital Pharmacy?" - University of Illinois Answers. The functions of the hospital pharmacy include: (1) compounding and dispensing

physician's prescriptions, (2) manufacturing pharmacy, and (3) training in hospital pharmacy. A brief report of the prescription volume, the quantity of drugs manufactured, and the number of students trained is presented. page 102

AMERICAN PROFESSIONAL PHARMACIST (May, 1945)

"Organizing Pharmacists in Government Service" by A.H. Moore, Chief Pharmacist, Veterans Administration Hospital, Alexandria, Louisiana - The development and objectives of the American Association of Government Pharmacists. page 442

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UNIVERSITY EXTENSION DEPARTMENTS OFFER

OPPORTUNITY FOR SELF-IMPROVEMENT

By Frank J. Steele,
Chief Pharmacist, Greenwich Hospital
Greenwich, Conn.

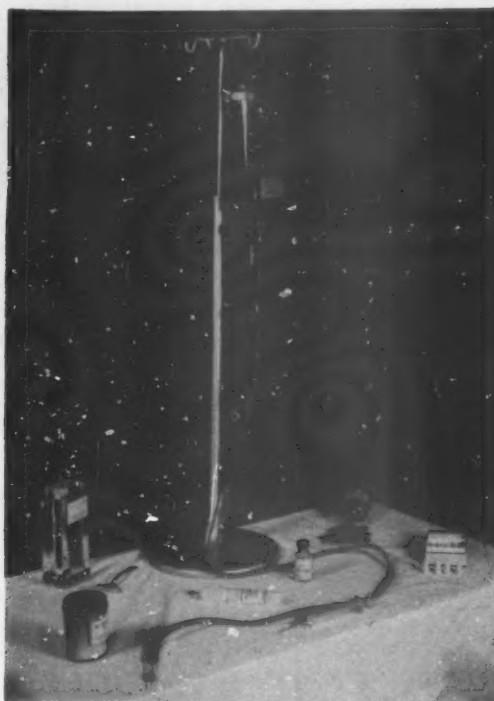
There are individuals in every community who are interested in advancing themselves both professionally and educationally. In the interest of the self-improvement of these people the foremost American universities have recognized a specific plan whereby they bring the university to the student, instead of the student to the university. These universities offer a plan of practical instruction so that one can prepare for vocational work or college. Their courses are made available to those who must devote their time to daily duties. Teaching by the extension method has become a part of the educational system, and it is possible to contribute largely to the requirements for the Bachelor's degree by combining work in residence with extension study under the General Extension Division.

The extension division has so arranged the courses that they are open to those who are prepared to utilize them profitably. We find that this extension-type of study appeals to the following groups: college students whom extension work enables either to continue their education while not in school or to earn additional credits during vacations; professional or business men and women such as hospital pharmacists who feel the need to supplement their college training and who as adults are interested and eager to keep abreast of the vital scientific, economic, and social changes in our modern civilization; teachers who wish to meet requirements for certificates, to secure additional college credits, and to prepare themselves for teaching in other fields; and high school students who desire either to supplement high school curricula or to complete diploma requirements.

This kind of work is intended to be utilized by the serious-minded student who is unable to take work in residence but who is interested in the mastery of a subject, and in this interest lies the real purpose of college credit or self-improvement.

The extension courses as given by the many American universities offer various advantages, a few of which are worthy of careful consideration by the serious-minded man or woman who intends to be helped by this method of study. These advantages are as follows: An extension course accommodates itself to a person's time schedule and personal conditions and does not interfere with his vocational or professional activities. It may be started at any time and, within certain limits, may be completed as rapidly as the student desires. The course of study will help one utilize one's leisure time more efficiently through the process of gaining new knowledge. It involves skill in encompassing the ideas of the study material, and teaches one to think logically and to express one's self capably. These advantages stimulate initiative, self-reliance, accuracy, and perseverance. This plan satisfies special interests, prepares one for special occupations, aids him in accumulating credits, and improves the mental or cultural growth of the individual. A few of the subjects offered which may be of special interest to the pharmacist are Bacteriology of Foods and Water, a special course in Chemical Water Analysis, Business Correspondence, Salesmanship, Business Law, Elementary Physiology, General Physics, Hygiene and Sanitation, Retail Store Management, Credits and Collections, Investments, Elementary Advertising, Insurance, Intro-

concluded on page 100



Dr. Harry Gold: The conference this morning is to deal with the routes of administration of drugs. We might do well to confine the discussion to drugs employed for their systemic action. There is hardly a tissue barrier in the body which is not used at one time or another for the transport of a drug into the circulation--the small intestine, the sublingual tissues, the rectal mucous membrane, the intact skin, the subcutaneous tissue, the muscle, the nasal mucosa, the vaginal mucous membrane and the spinal canal. Sometimes we get around all barriers and put the drug directly into the circulation, intravenously, intra-arterially or intracardially.

All factors being equal, I think we should probably agree that the oral route is the method of choice for the administration of drugs, as it is for the administration of food. The only trouble is that not all factors are equal, and there are circumstances under which it is desirable, or even imperative, to use some method other than the oral route. If one departs from the oral administration of a drug, one ought to have a pretty good reason for doing so, and I think that the general practice in that respect can be divided into three classes:

In the first class the validity of

ROUTES OF ADMINISTRATION

OF DRUGS

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parenteral administration is supplied by common sense. I think it is nothing more than that. One does not give the drug by mouth because the patient is unconscious, because he vomits, because he will not cooperate or because an emergency exists and one cannot wait for absorption.

In the second class, the parenteral administration of drugs depends on the results of sound pharmacologic experiments. There are innumerable examples in this class: One gives epinephrine by injection and not by mouth for very good and sufficient reasons based on pharmacologic facts; similarly for pituitary extracts by injection and also calcium salts, usually by intravenous injection. Bismuth subsalicylate in the treatment of syphilis is given by intramuscular injection, and not by mouth, because the object of treatment is to obtain a slow stream of bismuth entering the circulation over periods of weeks, sometimes months, and there is no other way to achieve that. Again, morphine sulfate is usually administered by subcutaneous injection rather than by mouth, and perhaps the reason for that is well known to you. It is relatively slowly absorbed from the intestinal tract; the analgesic action is brief, the general depressant action is long. To secure sufficient analgesia by the oral route requires doses which cause unnecessarily prolonged depression.

Those, then, are the first two classes. The first depends on common sense and the second on pharmacologic experiments. There is a third class of practice which

possesses no validity at all on the basis of our present knowledge. I now refer to the very widespread practice of giving common drugs by injection when the effective, less dangerous and less costly oral route is available. Not a vestige of evidence exists at the present time to justify the courses of injections of iron, cacodylate, iodides, bromides, salicylates and a host of other agents, frequently so given. A very large proprietary industry thrives on the doctor's predilection for the injection of agents that can be satisfactorily given by mouth.

When the question arises as to whether one should give a drug orally or intravenously when it can be given by either route, there is a tendency to assume that nothing more is involved than the matter of convenience of administration or speed of action. There are some important fundamental factors involved here which have received but little consideration. I want to mention one of them. If an animal is given a dose of atropine sulfate, say 50 mgm. per kilogram at one time intravenously, it will die almost immediately from circulatory collapse. If one gives the animal atropine sulfate much more slowly by subcutaneous injection, by mouth or even by repeated small intravenous injections, it requires a very much larger dose to kill the animal; but more than that, death takes place by a different mechanism. It dies now not from circulatory collapse at all but from paralysis of the myoneural junctions in the muscles of respiration. Another illustration with similar significance: If one injects a small dose of quinidine sulfate intravenously, one produces marked changes in the heart as shown in the electrocardiogram. However, one can give very much larger doses of quinidine by oral administration or by intramuscular injection, and one can kill the animal by these larger doses, producing convulsions, however, without any changes in the electrocardiogram. In short, it is not only a matter of convenience or speed of action. The pattern of action of a drug is not necessarily the same when given orally as when given intravenously. The difference is due to the difference in the concentration of the drugs in the circulation in the two cases, since the distribution of the drug to various organs of the body depends in a

large measure on the concentration in the blood stream.

How these matters stand in clinical therapy at the present time one can hardly surmise, for they have not been explored.

We cannot do much more this morning than to thrash out the pros and cons of the administration of some of the more common and important drugs that are used in therapeutics. Dr. Eggleston will lead the discussion.

THE CARDIAC DRUGS

Dr. Cary Eggleston: In the problems facing us in the administration of cardiac drugs, all of those touched on by Dr. Gold are represented. However, we can concentrate our attention, I think, on certain of those problems because of their greater frequency and greater importance.

It is my purpose not to discuss the actions of digitalis, or even the dosage of digitalis or of its various bodies and representatives, but to discuss the administration of these cardiac drugs as we face the problems in the treatment of cardiac failure.



*Digitalis purpurea
vulgaris*

Of course, the digitalis group heads the list when we speak of cardiac drugs. Here there is no question that the route of choice, the route par excellence, is

the oral route. In this connection we have to consider a number of problems: first the availability of the drug, then its uniformity, potency and absorbability, the uniformity as well as the rate of absorption, the duration of action, the cost, and finally minor problems such as the side actions of the drug and the ease of administration. But practically all of these desiderata can be met in the case of digitalis by the simplest representative of the entire group, the powdered leaf. This is available, inexpensive and readily absorbed, it is today of fairly uniform potency and high activity, the rate of absorption is satisfactory for the majority of patients, it is easily administered, and the duration of its action is well within the limits of desirability. For the oral administration of digitalis, as I have said, the powdered leaf is apparently the most desirable of all preparations as yet available. The dose is not too large. It can be administered in tablet form or in capsules or may be given as powders, although that is inconvenient. Pills are used, but much less commonly than the tablet or capsule. The powder may even be incorporated in suppositories, which I shall discuss in a few moments. The powdered leaf has the advantage of keeping well, although the tincture is not bad as to keeping properties. The dose is small in bulk but not too small for easy handling. The powdered leaf, once standardized, can be administered in terms either of weight or of its biologic activity. These, therefore, lead to the choice of the powdered leaf as the form of primary value. When given by mouth, absorption is complete in about six hours. Its duration of action varies, of course, with different individuals and with different preparations of the leaf and under circumstances some of which are not well known; but in general the duration of action is sufficiently long so that doses do not have to be repeated too frequently. It is usually satisfactory for maintenance purposes to administer a dose but once daily. This does not embarrass the patient and he is not as likely to forget it as he would be if he had to take repeated doses.

The powdered leaf can generally be taken by patients even in the presence of the minor degrees of nausea which are oc-

casionally associated with acute congestive heart failure, although at times this constitutes a barrier. There are certain psychic barriers which we must consider in the administration of digitalis orally. Most frequently they occur in a patient to whom digitalis has been administered unwisely so that nausea and vomiting have been induced. Sometimes such a patient believes himself utterly incapable of taking digitalis in any form, and occasionally this constitutes a real barrier to the administration of the powdered leaf, the tincture or any preparation with a name implying digitalis with which the patient has been familiar. We then occasionally have to resort to subterfuges and employ other preparations, of which I shall speak briefly.

Psychic nausea or vomiting usually can be avoided by administering the powdered leaf by rectum in the form of a suppository or as the galenic preparations of the powdered leaf, such as the tincture. The dose by rectum and the rate of absorption are not materially different from those by mouth. There may be minor variations. The rectal dose will perhaps have to be a little larger and occasionally a little less; however, this varies in individuals and is not a matter of major importance. Instead of resorting to the rectal route of administration we may use some of the newer more or less purified glucosides of digitalis or of its congeners, and for this purpose urginin, which is a mixture of the two active glucosides of squill, may be employed satisfactorily. It has the advantage of carrying no implication in its name that it is related to digitalis.

Amorphous gitalin, which was introduced under the trade name verodigen, may also be employed.

You may wonder why we do not resort immediately to parenteral methods of administration to avoid this psychic nausea or vomiting. This is primarily because we can avoid it without having to resort to the parenteral methods, and these methods with one exception are relatively unsatisfactory for the administration of digitalis.

The subcutaneous route should never be employed, I believe, primarily because all of the digitalis bodies that are potent are intensely irritating to the subcutaneous tissues; I have seen more than one instance in which they have been so given by error or intent and have resulted in very severe cellulitis or even in local necrosis of the tissues. Along with these inflammatory reactions the patients have suffered rather intense pain, often requiring morphine for relief.

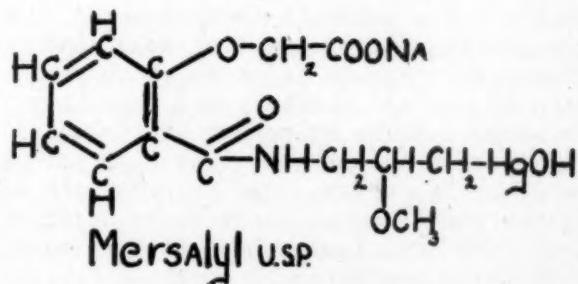
The intramuscular administration of digitalis bodies is an available route but one which is frequently abused, in my opinion. It is most commonly used in the hope of hastening absorption or of making sure of digitalization. I believe that this is a genuine error because in my experience the digitalis bodies are neither as uniformly nor as rapidly absorbed from intramuscular administration as they are after oral administration. Intramuscular injection produces much less local irritation than subcutaneous administration, but with some patients it is significant. Occasionally for unconscious patients and under other circumstances it may be necessary or desirable to resort to intramuscular injection. For this purpose we may use such partially purified preparations as digitoxin or digifoline, or we may resort to the strophanthins. Frankly, I have found very little need for intramuscular administration.

Intravenous administration, however, constitutes a method of great value in a very limited number of cases. There is only one agent which in my personal experience is sufficiently trustworthy and well understood to permit me to recommend it, and that is crystalline strophanthin gratus (ouabain). One may also employ the amorphous strophanthins, but these are less active and appear to be less stable, and I myself have not found them as desirable as ouabain. The indications for the resort to intravenous ouabain therapy I believe are summed up by saying that it may be valuable when one is faced with a grave emergency and the patient has not previously been receiving digitalis. The total dose of ouabain for this purpose is approximately 1 mg. for effective digitalization. This total dose had best not be given in a

single administration. It is wiser to give half of that dose, 0.5 mg., initially. The action is prompt. The injection should be reasonably slow and in sufficient dilution, say 10 cc. About five or ten minutes should be allowed for the injection. The actions will be manifest, if they are to appear, within fifteen to thirty minutes and will be fairly well developed by the end of an hour or possibly two, when one can judge effects sufficiently accurately so that subsequent fractions of the total dose of 1 mg. may be added at intervals of one-half to one or two hours, to secure adequate digitalization.

The objections to the intravenous use of ouabain, aside from those mentioned by Dr. Gold, are that it does not seem justifiable to continue treatment by this route; the action is fairly brief, and to maintain digitalization it would be necessary to give two or three doses or more in twenty-four hours. This is scarcely justifiable except as an emergency measure, and even then one should begin to administer digitalis by the intestinal tract, by mouth or by rectum so as to pick up and maintain action.

The next group of drugs of importance in heart disease is the diuretics, and these can be passed over briefly as to their routes of administration. The various members of the purine family, theophylline, theobromine with sodium salicylate, theocalcin and the like are all best administered by mouth for the purpose of producing diuresis. None of these are too well borne by the gastrointestinal tract, and nausea and vomiting may result and constitute a



problem in their further administration. Theophylline with ethylene diamine (aminophylline) is occasionally of some value intravenously for the specific purpose of checking Cheyne-Stokes respiration or cardiac asthma, when its action is exceedingly prompt. Other diuretics in this group need not be mentioned.

The mercurials constitute the most important group of present day diuretics, and these are best administered intravenously to avoid their local irritant actions. They are quite irritant to the local tissues when injected subcutaneously. When the mercurials, either mercupurin or salyrgan (mersalyl), contain an added amount of theophylline (mercupurin is a combination of mercurin with theophylline), their local irritant effects are materially reduced, and they may, if necessity dictates, be administered intramuscularly. The mercurial fraction of mercupurin as well as mersalyl can be administered successfully by suppository, but in many instances this produces so much local discomfort in the rectum that the patient is unwilling to continue their use. Hypertonic solution of dextrose is scarcely a drug, and it must be administered intravenously for diuretic purposes. Urea is administered by mouth. Other diuretics are of small value.

Dr. Gold has saved me a good deal of time in discussing the question of the sedatives and hypnotics. He has already spoken of morphine, which is I believe the most important sedative for the cardiac patient, and I quite agree with him that it should be administered subcutaneously. Substitutes for morphine are available, such as dilaudid, pantopon, and codeine. My own experience leads me to favor morphine over all these substitutes. Other sedatives are primarily administered through the gastrointestinal tract and embrace such agents as hydrated chloral, which is far too irritant and which has too large a dose, to permit of its being administered in any other way than through the digestive tract. The bromides and the soluble barbiturates may both be administered intramuscularly. Paraldehyde should be given by rectum or by mouth.

The nitrites should also be given

orally or by inhalation. If orally the best is glyceryl trinitrate and its administration is best under the tongue, whence it is absorbed with great rapidity and effectiveness. Amyl nitrite is, of course, administered by inhalation. It smells bad to many and its administration is not readily controllable in any event.

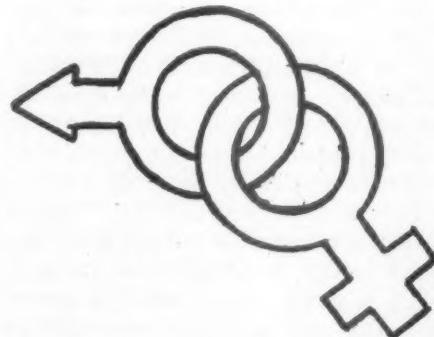
Quinine and quinidine are ordinarily most conveniently administered orally. They may on occasion be administered intravenously but very slowly and in very dilute solution.

One final preparation deserves mention, and that is acetyl-beta-methylocholine, which is administered subcutaneously and is resorted to only as an emergency remedy for the checking of a paroxysm of auricular tachycardia.

Dr. Gold: We shall reserve discussion until the latter part of the conference. Dr. Shorr, will you discuss the modes of administration of the sex hormones?

SEX HORMONE PREPARATIONS

Dr. Ephraim Shorr: Since it is the intention in this conference to discuss not the therapeutic indications for the use of the sex hormones but merely the choice of modes of administration, I shall confine what I have to say to the latter aspect.



There are two groups of hormones which

employed in dealing with problems of sex physiology in the human being.

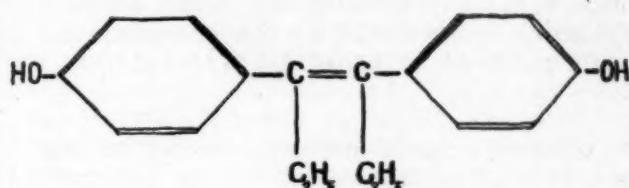
The first comprises those whose purpose is to stimulate the gonads into activity when function is either absent or subnormal. These are called gonadotropic hormones and are obtained from three sources.

The first source is the anterior pituitary gland, from which an extract with definite gonadotropic activity in animals has been prepared. It is protein-like in character and still crude from the chemical point of view. It is meant for subcutaneous administration and is practically always employed by this route.

The second type of gonadotropic preparation is obtained from the serum of pregnant mares. It is available in a much more purified state than the gonadotropic principle from the anterior pituitary. This hormone may be given subcutaneously, intramuscularly and intravenously. This last route is recommended because it brings the hormone in considerable concentrations into the blood stream in a short time and may prove the most economical way of bringing about an effect.

When mare serum hormone is given subcutaneously or intramuscularly there appears to be little local or general reaction, so that large doses can be given with safety. If the intravenous route is employed, an effort should be made to ascertain whether or not any undue sensitivity exists in the individual patient. This can be done by skin testing. I have encountered a number of reactions in patients even though skin tests were negative, but they were fortunately mild. They consisted of a flush lasting about five minutes, and in some instances urticaria.

The third type of gonadotropic hormone is derived from pregnancy urine. This is the chorionic gonadotropin and is, like the pituitary extract, still too crude to use intravenously. Its use is frequently associated with local reactions which take the form of redness and swelling, or general reactions such as malaise, elevation of temperature and generalized aches and pains. For these reasons it is



Diethylstilbestrol

desirable to start with low doses and to work up gradually to the desired maximum. In this way unpleasant reactions can be avoided. These precautions hold for both pregnancy urinary extracts and extracts of the anterior pituitary.

The second form of therapy is of the substitutional type and consists in the administration of the hormones, elaborated by the gonads when insufficiency exists. Turning first to the secretions of the ovary we find four available. Three belong to the group of estrogens. They are estrone, estradiol and estriol. The first two are suitable for parenteral and oral use and the last for oral use.

The most common mode of administration of estrone and estradiol is intramuscular. The reasons for this lie in loss of potency when administered orally. Both these compounds lose anywhere from 90 to 95 per cent of their activity when given by mouth. One can, of course, take this loss of efficiency into account and correct for it. When this is done the full therapeutic dose may be given by mouth. At the moment it is a matter of economics and awaits an improvement in chemical methods which will reduce the cost of these preparations.

Estriol (theelol) is also effective by mouth but the amounts of the present commercial preparations that are feasible to use are too small to benefit most of the patients with a menopausal syndrome. More recently several workers have implanted crystals of estradiol with very bene-

ficial effects. The hormone is slowly absorbed and a small amount lasts a long time. One disadvantage to be considered as regards this method of administration is the possibility that its use for patients with intact uteri may bring about continued hyperplasia of the endometrium which may lead to bleeding difficult to control.

The estrogens are very useful in the form of vaginal pessaries in the treatment of local conditions such as senile and gonorrhreal vaginitis, when the therapeutic aim is not the general effect of the hormone but a local action on the vaginal mucosa, to induce hypertrophy and resistance to infection.

The fourth hormone elaborated by the ovary is the progestational one, progesterone. It is given intramuscularly in oil. A derivative with progesterone-like action, pregnenolone, is available for use by mouth, and gives promise of being effective by this route.

The androgenic hormones, of which the most generally used form is testosterone propionate, are at present chiefly employed in an oily vehicle by the intramuscular route. They apparently lose even more of their effectiveness when given by mouth, so that the oral route is out of the question at present. A derivative, methyl testosterone, may prove to have a greater oral efficiency, but the factor has not as yet been worked out.

More and more, the advantages of pellets implanted subcutaneously are becoming recognized. This mode of administration has the disadvantage of necessitating a minor surgical procedure, but it has the great advantages of prolonged and sustained action and economy.

I should like to mention briefly a synthetic estrogen, stilbestrol, which is inexpensive, highly active, and loses but little of its efficiency when given by mouth. Its use in this clinic has, however, been associated with so many toxic effects that we consider it potentially dangerous and undesirable for human use, certainly until more is known of the nature of the side reactions.

Dr. Gold: Dr. Washington, will you discuss these problems from the standpoint of pediatric practice?

ADMINISTRATION OF DRUGS TO CHILDREN

Dr. John A. Washington: In pediatrics we use about the same drugs that are used in adult medicine. Any differences lie in methods of administration and of course in dosage. Differences in administration are based less on physiologic considerations than on practical considerations having to do with the ability of the patient to swallow or retain the drug. In the first place, we are not usually able to give rectal instillations or suppositories to infants and small children because these patients will not retain them. By strapping the buttocks with adhesive tape it is possible to make use of quickly absorbed drugs, such as avertin with amylen hydrate, with some degree of success, but even with this strapping some loss of the instillation usually occurs. The oral route therefore must be heavily relied on.

Here there are certain limitations peculiar to pediatrics. In the first place, we can't use pills for infants and small children. Infants will usually spit them out. Small children will chew them up, which usually results in more or less spitting when the taste is appreciated. Consequently, medicines for these patients must be in a dissolved form or at least suspended in a liquid. Infants will swallow unpleasant tasting liquids to a surprising extent.

However, this does not always happen. It is when they begin resisting that our difficulties begin. By holding the nose an experienced nurse can usually get almost any dose down. In the home, however, one can never be sure how much a sympathizing mother will manage to get into a young child. Besides the danger of a struggling child's not getting the drug down, there is always the danger of his aspirating some. If the substance is oily and if the performance is repeated often, the danger of lipid pneumonia developing is very real.

A number of drugs are used both by

mouth and hypodermically. Some of the reasons for resorting to the use of a needle can be illustrated by the administration of calcium compounds in infantile tetany. When convulsions are occurring or, even worse, when laryngeal spasm is present, getting calcium and a sedative into the patient is an emergency measure. Most calcium compounds are rapidly enough absorbed after oral administration, but a baby with tetany cannot be counted on to swallow the medicine, and one does not want to increase his spasm by the struggle which accompanies forcing it. I know one experienced pediatrician who prefers to pass a small catheter into the stomach and put a solution of calcium chloride and the sedative through that. The usual procedure, however, is to use a solution of calcium gluconate intramuscularly. This involves no more disturbance than passing a catheter and has an added advantage in that the drug can't be vomited. With the relief of the spasm, which is usually prompt, one can continue the treatment with oral doses.

The technic of administering drugs intravenously is different from that in adult medicine, chiefly in that there are no prominent veins in the antecubital fossae. In the skin of the scalp, however, there are a number of superficial veins which can be entered with surprising ease. To do this one has to shave a patch of the scalp. In the hospital this is done often, more for the administration of fluids of course than of drugs. Babies with diarrhea often receive several infusions a day for a number of days.

Through these veins the newborn babies with acute syphilis can be given their first arsenic injections. When these patients are discharged to the outpatient clinic they are not usually subjected to this scalp-shaving procedure, and intramuscular injections are relied on until veins develop in their antecubital spaces.

I might mention here that the inunction method of giving mercury in congenital syphilis has in many clinics been abandoned, and bismuth injections have been substituted. One good reason for this is that one could never be sure how conscientious the mother might be in giving the rubs.

DISCUSSION OF QUESTIONS

Dr. Gold: The conference is now open to general discussion.

Dr. Eugene F. Du Bois: I should like to bring out a practical point about the tincture of digitalis, which was the form in use about ten years ago. A good many men do not realize the enormous difference between the drop and the minim of a tincture. I think the general practitioner usually considers that they are synonymous when as a matter of fact it takes about $2\frac{1}{2}$ drops of the tincture of digitalis to make 1 minim.

Dr. Walter Modell: There is a standard minim dropper.

Dr. Eggleston: That measures the minims but does not drop them. Apparently, there is no standard method for dropping which will secure uniformity in the measurement of an alcoholic preparation. Furthermore, Dr. Du Bois's question brings up a feature of undesirability of the tincture and other fluid preparations of digitalis in that the responsibility for measurement generally devolves on some one in the home who is not trained and rarely can measure accurately, even if provided with measuring utensils.

Dr. George A. Schumacher: I want to ask the conference a question in regard to the use of sedatives for cardiac patients. The problem frequently comes up in the ward of elderly patients with cardiac insufficiency who also have cerebral arteriosclerosis. Such patients are often restless and irritable and hard to control. Sometimes when they are in the oxygen tent they beat on the sides of the tent and try to get out, and we want to keep them at rest as much as possible. We want to keep away from the barbiturates in those cases. We are told that bromide and chloral hydrate are preferable sedatives for those patients, but on the other hand we are also told that chloral hydrate is a rather dangerous myocardial depressant, so we are oftentimes left not knowing what to do.

Dr. Eggleston: I believe that this idea about chloral hydrate being a danger-

ous myocardial depressant is rather exaggerated if it is given in reasonably conservative doses and the dosage gaged by the effects and kept at the desired level. When that is done ill effects are very unlikely to occur. When chloral hydrate is combined with bromide its action is sometimes more lasting and the amount to be used can be reduced. Here is a particularly useful field for paraldehyde. Paraldehyde has only two objections: inconvenience of administration on account of its physical properties of taste and smell, and its persistent odor on the breath no matter how administered. These are very minor under circumstances such as you have mentioned, and so far as I am aware paraldehyde is virtually nontoxic in sedative doses. We have a patient upstairs now who has been taking between 70 and 130 cc. of paraldehyde in twenty-four hours over a period of several months without any detrimental effects whatever. It is the only thing which keeps him quiet.

Dr. Gold: It might be well for us all to taste a solution of chloral hydrate. It has a very disagreeable taste and it is quite irritant. It behaves like a liniment; in fact, together with some camphor it makes a pretty good liniment. We ought to be sure its taste is well masked with syrup of orange peel and that it is well diluted before giving it. I have seen disaster following chloral hydrate in a case of cerebral hemorrhage in which the bleeding was resumed as the result of the vomiting from an insufficiently diluted solution.

Dr. Eggleston: In dilute form it can be administered by rectum very successfully.

Dr. Ade T. Milhorat: I think that electrophoresis should be mentioned as a mode of administration. That certain substances can be so introduced into the organism is shown by the general systemic effects produced when electrophoresis is applied locally. The term "iontophoresis" is somewhat unfortunate and serves no useful purpose. The principles underlying this method are imperfectly understood, and the methods employed frequently are unsatisfactory and even crude.

Dr. McKeen Cattell: I should like to ask Dr. Eggleston how it happens that ouabain is the glucoside of choice for intravenous administration. It would seem to be at the wrong end of the scale with reference to the rapidity of elimination.

Dr. Eggleston: Perhaps I had better say drug of choice for me. I feel that it probably is the drug of choice in the present state of our knowledge of the glucosides of the digitalis family because it appears to be the one which, being crystalline, is most nearly uniform in its composition and activity, although possibly some of the newer crystalline glucosides derived from digitalis, such as digitoxin (digitaline native) may supplant it. However, most of those are not as readily soluble, or not as soluble in water or in physiologic solution sodium chloride, as is ouabain. Finally, our experience with ouabain has been very extensive, so that we have come to know both its indications and its limitations, I believe, much more satisfactorily and thoroughly than is true of any other of the digitalis glucosides. The other strophanthins are for the most part impure and amorphous, and unless they are biologically assayed they cannot be used with the same sense of assurance and the same degree of reasonable safety as ouabain can. I might add as a matter of interest for the students that I have not given nor have I seen given in my services at this hospital or at Bellevue Hospital a single intravenous administration of ouabain in several years, so it is not very necessary.

Dr. Cattell: Perhaps this is an appropriate place to emphasize an elementary principle which in certain instances determines the route of administration of drugs. In general, the intensity of drug action is proportional to the concentration attained in the blood stream and this in turn is dependent on the relationship between the rate of absorption and the speed of elimination. The dose of substances such as the digitalis glucosides or barbital, which are eliminated slowly, is of the same order regardless of the route of administration; on the other hand, when elimination is rapid, such as is the case, for example, with epinephrine and acetylcholine, an effective concentration in the blood can

be attained only by a route which introduces the drug into the circulation rapidly.

Dr. Janet Travell: I should like to comment on Dr. Eggleston's statement that glyceryl trinitrate is absorbed with great rapidity when placed under the tongue.

It has long been recognized that some drugs, especially morphine, are absorbed faster when held in the mouth than when swallowed. However, there seems to be no clear statement in the literature as to what types of drugs can be absorbed better from the mouth than from other parts of the gastrointestinal tract. By "better" I mean that absorption may be either faster or more complete.

One of the digitalis bodies, strophanthin, has been studied in this respect. Some years ago Dr. Eggleston reported that strophanthin, which poorly and irregularly absorbed when given orally, also produced no demonstrable effects on patients when placed under the tongue. However, we do not know the reasons for the very poor sublingual and gastrointestinal absorption of this glucoside.

There is one class of compounds, namely the alkaloids, which experiments in our laboratory have indicated should be absorbed much faster when retained in the mouth than when swallowed. We have shown that the hydrogen ion concentration plays an important role in the absorption of alkaloids from the gastrointestinal tract. A high degree of gastric acidity will completely prevent their absorption from the stomach, whereas absorption occurs rapidly in the nearly neutral intestinal juices. If, however, the pH of the gastric juice is rendered neutral or slightly alkaline, absorption of alkaloids then occurs about as rapidly from the stomach as from the soft cutaneous tissues. The high pH of the saliva would favor prompt and rapid absorption of an alkaloid from the oral mucous membrane, whereas after swallowing the drug a delay in the appearance of effects would occur until it had reached the small intestine.

The influence of the pH on the absorption of alkaloids from membranes and surfaces other than the gastrointestinal mu-

cosa has been known a long time, but it might well be emphasized here. For example, alkalization of a solution of cocaine increases the rate of penetration of this anesthetic. Nicotine poisoning results from the application of a solution of nicotine base to the skin, but poisoning does not occur when the sulfate is similarly applied. Thus the acidity or alkalinity of a solution, which determines the amount of the free alkaloidal base present, is a factor of practical importance in the absorption of alkaloids. This probably applies to all routes of administration.

Dr. Cattell: Solution of posterior pituitary is a familiar example of a drug which is ineffective when given orally, owing to proteolytic digestion in the gastrointestinal tract, but which is readily absorbed by the nasal mucous membrane.

Dr. Gold: May I ask Dr. Eggleston a question in regard to rectal administration? It is said that rectal administration of digitalis is more effective than oral administration because when given by rectum the material escapes the destructive action of the liver. I have reference particularly to the study which Robert Levy made some years ago, in which he took issue with that notion.

Dr. Eggleston: Yes, I think Dr. Levy's studies and the experiences of many of us have shown that if such destruction does occur, it is of no material importance. Certainly digitalis is absorbed by rectum with a very reasonable approach to the efficiency with which it is absorbed by mouth, and absorption does not vary materially. I would take issue with the suggestion that it is more effective when administered by rectum than when administered by mouth; the evidence points to the need for administering somewhat larger doses by rectum than by mouth to accomplish the same effect, so that I doubt if absorption is better by rectum than by mouth. There does not seem to be much evidence for destruction by liver when the dose is administered orally. It is probable that a part of that administered by rectum passes through the liver, too, if not the major portion of it. We do not know, but Levy's experiments, which were designed to show the site of absorption, in which he utilized a radiocon-

trast substance, showed that administration by rectum from solutions of digitalis was followed by their rapid passage into the upper reaches of the rectum, from which absorption carries them through the liver rather than through the shunt that occurs from the extreme lower end of the rectum.

SUMMARY

Dr. Gold: I may now briefly summarize some of the chief points which issue from the discussion this morning. The oral route is the method of choice and parenteral administration should not be used without satisfactory proof of special needs. There is experimental indication that the distribution of a drug, and therefore the pattern of its action, is not necessarily the same by oral as by intravenous injection, and this might influence therapeutic results. Therefore, more than the matter of convenience and speed of action is involved in parenteral administration. The subject is in need of clinical study.

Most of the drugs used in the treatment of heart failure are generally given by oral administration: digitalis, the xanthines as diuretics, the nitrites, quinidine and the hypnotics. Intravenous digitalis medication is rarely necessary, and in that case ouabain is preferable. The digitalis preparations are too irritant for subcutaneous injection. The mercurial diuretics are best given by the intravenous route. Aminophylline has special advantages by intravenous injection in Cheyne-Stokes respiration. Acetyl-beta-methylcholine is best given by subcutaneous injection.

It is suggested that the danger of chloral hydrate as a sedative for cardiac patients is exaggerated. But, since it is quite irritant, it must be well diluted and its disagreeable taste masked for oral administration. Paraldehyde is regarded as a particularly safe sedative for cardiac patients.

The sex hormones (gonadotropic hormones, estrogens, progesterone, androgens) are at present employed mostly by paren-

teral routes for reasons of efficacy and economy. The loss of potency is too great by the oral route. Only one is sufficiently pure for intravenous use, namely the obtained from mare serum. The others are given subcutaneously or intramuscularly.

The special problems of administration of drugs to children were discussed. Liquid preparations and the parenteral route are particularly applicable to the sick infant who either can not or will not take medicines in other forms.

The recent studies on the role of the pH on the absorption of alkaloids were discussed. These drugs penetrate tissue barriers much more quickly when the medium is strongly alkaline than when it is acid.

Attention was called to the nasal mucosa as an absorbing medium for drugs which are not effective by the oral route.

The view that drugs absorbed from the rectum act differently from those given by mouth because the former escape the action of the liver is shown to be incorrect. The evidence is that most of the absorption takes place in the upper portion of the rectum which drains into the portal circulation.

Note: These are actual reports, slightly edited, of conferences by the members of the Departments of Pharmacology and of Medicine of Cornell University Medical College and the New York Hospital, with the collaboration of other departments. The questions and discussions involve participation by members of the staff of the college and hospital, students and visitors.

Cotton As A Filtering Agent, concluded from page 68

will result in plugging the funnel as the cotton will wedge in the stem, (2) too large piece of cotton will slow the filtering of the material unduly, (3) failure to turn in the edges of the loose cotton fibers will permit them to hang in the stem of the funnel and either clog the filtering of the solution or lead to unnecessary presence of fibers in the filtrate.



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Asbury Hospital, Minneapolis, Minn.

Belle H. Moskowitz
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Andrew F. Musiello
Mt. Vernon Hospital, Mount Vernon, N.Y.

Fred R. Nichols
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Traverse City, Michigan

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Muriel E. Wootton
Oakridge Hospital, Oakridge, Tenn.

Mrs. R. J. Zola
U.S. Marine Hospital, Brighton, Mass.

Hospital Pharmacy in a College Curriculum
Concluded from page 71

courses will be admitted to the curriculum as occasion arises and it is hoped that those connected with the training of interns in the pharmacies of our hospitals will send us suggestions to aid in the development.

Organization News (concluded from p. 81)

Moore, secretary of the association:

Harvey P. Currier, chairman
Publicity Committee
Veterans Administration
Danville, Illinois

Samuel Kay, Chairman Program
Committee
Veterans Administration
Canandaigua, New York

George F. Archambault, Chairman
Constitution and By-Laws Committee
U.S. Marine Hospital
Boston 35, Massachusetts

B. R. Cole, Chairman
Minimum Standards Committee
Veterans Administration
San Francisco, California

Grover Cleveland Bowles, Member
Membership Committee for U. S. Naval
Pharmacists, PhM/lc, U.S.N.R.
U.S.S. PCS 1401, c/o Fleet P. O.
San Francisco, California.

EXTENSION EDUCATION, concluded from page 81

duction to Accounting, General Chemistry, Organic Chemistry, Introduction to Physics, and Introduction to Physics Laboratory. These constitute just a few of the many courses offered by our American Universities.

Courses offered in various fields by the universities in which pharmacists may be interested are accounting, economics, chemistry, health, insurance, journalism, mathematics, psychology, and speech. There are various courses which are subdivisions of these main topics. These courses offer college credit and may be applied toward a university degree. The individual must meet certain requirements upon matriculation but each university has its own specific requirements; so, if questions arise, its bulletin should be consulted. The amount of university credit derived from extension courses which may be used to satisfy the requirements for a degree varies from 25% to 50% of the total. The bulletin of the university shows the course, the amount of credit each course carries, and the number of credits that may be applied toward a degree. Information concerning courses may be obtained directly from the university or from the bulletin of the National University Extension Association, Bloomington, Indiana.

There are some European universities which may grant degrees in absentia but their requirements are very high and carefully safeguarded. These requirements cannot be considered at this time.

I believe that the pharmacist can obtain valuable information through courses offered by these universities, an information that will aid him in maintaining his professional status both competently and confidently. This is not a complete list but only a guide to those who care to look into the matter further, to make use of their spare time by study, and to earn additional credits. This method is well adapted for those who are located where they cannot attend classes at night school and where there is no college located within their home town, and who, because of their work, are unable to attend a university.